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...THE...

OPHTHALMIC RECORD

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The March number of the OPHTHALMIC RECORD will contain (among others) an original paper by DR. F. W. MARLOW, on the Use and non-use of the Occlusive Bandage in cases of Heterophoria; one by DR. HERBERT HARLAN, a Case of Amblyopia from a Large Dose of Quinine Sulphate; one by DR. C. M. HOBBY, on the Treatment of Strabismus in Childhood; one by DR. DE SCHWEINITZ, on the Employment of the Skiagraph in Detecting Intraocular Foreign Bodies. There will also appear reviews of the most recent contributions to Ophthalmology published here and abroad, book notices, editorials by prominent Ophthalmologists, society reports and miscellaneous items of interest.

The "Record" particularly desires short, practical papers on any subject connected with Ophthalmology. These will be published at as early a date as possible. It is understood that, unless otherwise arranged, original articles when accepted are contributed to the Record exclusively. Illustrative cuts will be made at the expense of the journal and proofs for correction will be sent to authors when desired. Reprints with covers are furnished at cost. One hundred of these will be presented to authors *gratis* when a request for them is written on the original manuscript. The RECORD will be issued monthly and each number will contain about 54 pages of reading matter.

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NEURO-RETINITIS

By Dr. C. H. Beard

CHICAGO PHOTO-ENG. CO., CHICAGO

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THE

OPHTHALMIC RECORD

VOL. VI. CHICAGO FEBRUARY, 1897 NO. 2 NEW SERIES.

ORIGINAL ARTICLES.

"A SKIASCOPY DISK."

BY DR. S. MITCHELL.

Of Hornellsville, N. Y.

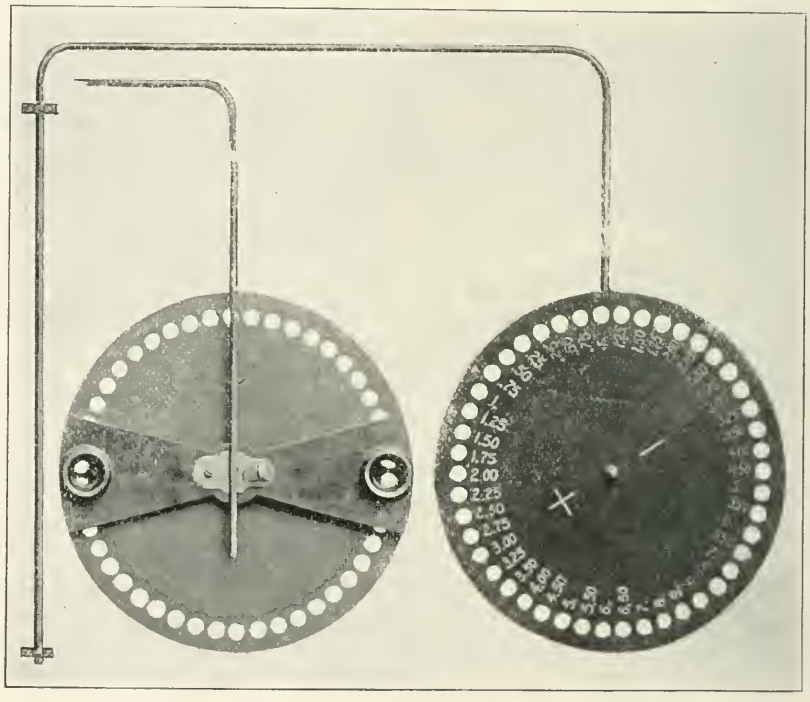
Oculist and Aurist to St. James Mercy Hospital. Oculist to the Erie Railroad.

ILLUSTRATED.

The accompanying illustrations are fair representations of a skiascopy disk that I have, in the past five years, come to regard as indispensable in the employment of this most valuable objective test for ametropia. I am fully aware that there is nothing new or novel in a disk of this sort. I first saw a description of one about five years ago in "*The American Journal of Ophthalmology.*" I cannot now recall by whom it was written. It was from this article, and an illustration that accompanied it, that I received the idea, and took pattern for the construction of my disk.

The only excuse that I can offer for presenting a description of the disk, is to show how one of these useful adjuncts to the oculist's armamentarium, may be procured without any great expense. It is constructed entirely of wood, is 16 inches in diameter, and has 46 apertures near its outer border for the reception of lenses, that are three-fourths of an inch in diameter. This work was all done for me by the Frost Veneer Seating Company of 208 Canal street, New York. It cost, including expressage $1.50. It is made by glueing two birchwood veneers to either side of a thin piece of whitewood. The grain of the wood is made to cross in such a manner that there

is absolutely no warping, although it is but $\frac{5}{32}$ of an inch thick. The immediate application of a wood filler, and painting the whole a dead black, was of course instrumental in preventing any warping. The lenses were made from discarded spectacle lenses, such as every oculist, who keeps a stock of lenses, is sure to accumulate on account of odd sizes, or from having the edges slightly nicked. These were ground to the proper size and shape by my optician, and by means of a little glue they were easily and securely fitted into the disk.



The lenses are of all foci, from 0.25 D to 9. D, that it is practical to employ in skiascopy. There are twenty-three of each, plus and minus. The numbering of the lenses, convex in white and concave in red, is done in figures of sufficient size to be easily read at ten feet. The disk turns on a $\frac{1}{8}$-inch iron bolt, that passes through the hour glass-shaped piece at the back of the disk. This piece is of cherry, and is $\frac{3}{8}$ of an inch thick. Apertures, fitted with elevated eye pieces, are in either end of this piece, and correspond exactly to the lenses in the disk. In the center of the piece is a clamp, made of sheet-iron and worked with a thumbscrew. This holds the whole

apparatus upon the rod, or admits of any adjustment of the same. The rod is a ⅜-inch brass veneered curtain rod, six feet long and bent to form three sides of a square. One side is secured to the wall in the dark room, at a convenient distance from the floor, by means of a loop and socket. The opposite side holds the disk. Thus it can be swung into the room a distance of two feet, and brought before the right or left eye of the patient who is seated before an adjustable gas bracket. The turning of the disk is intrusted to the patient, and as the whole apparatus is so light and simple, it can be easily and satisfactorily manipulated by any person, endowed with sufficient intellect to manifest a desire for relief from eye strain.

In practicing skiascopy with the assistance of the disk, I consider any additional appliance, whereby cylinders can be employed in determining the amount of astigmatism, as superfluous and unnecessary.

While making an examination, the light is placed slightly above and back of the patient's head. Then I seat myself directly in front, and about four feet from my patient, who is directed to fix the eyes upon a small dot on the wall fifteen or twenty feet away, and slightly above the level of the eyes. I always use the concave mirror of the ophthalmoscope. The movement of the shadow in every meridian is carefully noted, as each successive spherical lens of increased strength, is brought before the eye, until the meridian of the least ametropia is reached.

This will be clearly indicated, by a reversing of the shadow movement in this meridian, even to the last quarter of a dioptre. The amount of ametropia in one principal meridian having been determined and recorded, it is a very simple matter to proceed with the test until the point of reversal is reached in the other; and the total amount of error is thus determined. If the case be one of simple astigmatism, the task of ascertaining and recording the same is accordingly simplified. My method of recording the findings of the skiascopy test, is by means of a large $_{+1}\mathbf{T}^{+2}$ for each eye. This is drawn with the desired inclination in each case, to cause the lines to indicate the two principal meridians. These simple sketches, with the annexed + or — signs, and the figures to indicate the amount of error in each meridian, are invaluable assistants to have at one's command during the subjective test that follows.

THE LOCATION OF OPACITIES NEAR THE POSTERIOR POLE OF THE LENS BY MEANS OF THE CORNEAL REFLEX.

BY EDWARD JACKSON, A. M., M. D.

Professor of the Eye in the Philadelphia Polyclinic, Surgeon to Wills' Eye Hospital, Philadelphia.

ILLUSTRATED.

It is sometimes stated in works on ophthalmology that the apparent position and movement of an opacity in the dioptric media, as seen with the ophthalmoscope, depends on its relation to the center of rotation of the eyeball. That an opacity in front of the center appears to move downward when the cornea is rotated downward or the observer's eye is moved upward, while an opacity back of that center appears to move in the opposite direction.

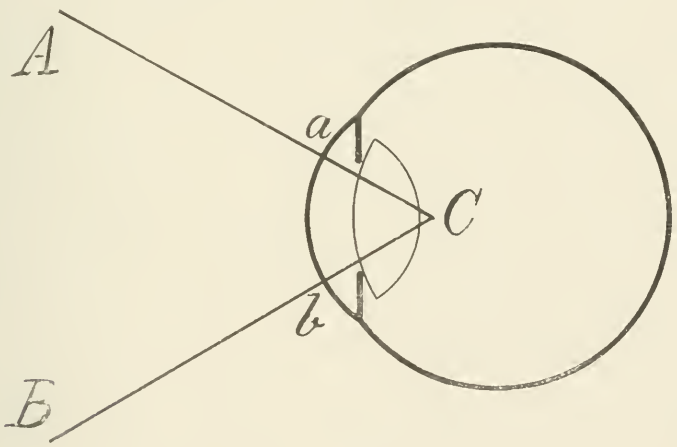
This statement is incorrect. It is true that a downward rotation of the cornea does carry with it an actual downward movement of all parts of the eyeball situated in front of the center of rotation, and an upward movement of all parts of the eyeball situated back of that center. But the actual relation of the various parts to the center of rotation of the eyeball is something that is not apparent—something of which the surgeon is never conscious—for the center of rotation is never seen as a point to which other objects can be referred.

The prominent landmark to which we do refer the apparent position and movement of isolated opacities in the dioptric media is the margin of the pupil. Those situated behind the plane of the pupil appear to move across it in the same direction as the observer moves his eye, or in the opposite direction to that in which the patient's cornea is turned. Those situated in front of the plane of the pupil appear to move in the direction the patient turns his cornea, or in the direction opposite to that in which the surgeon's eye is moved. An opacity lying in the plane of the pupil appears to keep a fixed relation to the pupillary margin whatever the direction in which the eye is moved, or whatever the direction from which the observer views it.

To judge of the distance of the opacity from the plane of the pupil we have to depend on the rapidity of its apparent movement across the pupil, or the extent of the excursion required to carry it entirely across the pupil. This paper, however, is written to call attention to another point to which opacities can be referred, with great accuracy when they are situated near the posterior pole of the lens or in the anterior vitreous, namely, the center of curvature of the cornea. To some ophthalmologists the method will not be new, for, as Dr. H.

Knapp informs me, it has been known "ever since Listing published his paper on Parallactic Movements of Opacities in the Eye, more than forty years ago." He has also mentioned it in a book review in the *Archives of Ophthalmology, 1895, Part iv. p. 553.* Still it has not been known to a large part of the profession; and has been quite ignored in recent ophthalmic literature.

When, with the ophthalmoscope, one looks into an eye the bright reflection of the lamp flame from the corneal surface occupies the portion of that surface perpendicular to his line of sight. That is, the reflection is seen in the direction of a normal or radius of the cornea. Now as all radii of the corneal surface pass through the center of curvature of that surface, the reflex is always seen in the direction of that center of curvature. Thus in the figure:



The surgeon looking into the eye from A will perceive the reflex at the portion of the cornea A in the direction of C the center of curvature. And on looking into the eye from B he will see the reflex at B again in the direction of C the center of curvature. As he moves from A to B the reflex seems to move across the pupil, its rate and extent of movement being exactly what would be the rate and extent of the movement of an opacity situated at the center of curvature of the cornea. Any opacity situated in front of this would appear to move across the pupil more slowly than the corneal reflex; and any opacity situated behind the center of curvature of the cornea would move across the pupil more rapidly than the reflex.

With the ophthalmoscope we can watch together the apparent movements of the corneal reflex and of opacities of the media situated

in the region, of the center of curvature of the cornea, can compare them and can detect slight inequalities of movement, and thus determine with great exactness whether the opacity is in front of or behind that center of curvature. With the ophthalmometer we may also measure with exactness the curvature of the cornea, that is the distance the center of curvature is behind the surface of the cornea.

The average radius of curvature of the cornea is about 7.8 mm. The distance of the posterior pole of the lens behind the summit of the cornea is usually given as 7.2 mm. With these dimensions the center of curvature of the cornea falls to 0.6 mm. behind the posterior pole of the lens. In particular cases of posterior polar cataract I have demonstrated that the posterior pole of the lens was as deep as the center of curvature for the cornea or even deeper.

It is well known however, that the cornea is in general markedly flattened at its periphery. The radius of curvature at 7.8 mm. is only for the central portion. Near the margin of the cornea the radius of curvature is longer, the center of curvature is farther back. Often in the part of the cornea available in this kind of an examination the the difference between the curvatures at the center and the margin of the pupil is very noticeable. By taking careful measurements of portions of the cornea through which an opacity corresponds in direction with the corneal reflex, it becomes possible to fix its exact depth within the eye, when somewhat deeper than the center of curvature for the middle part of the cornea.

For exact accuracy with this test one caution is necessary. The corneal reflex is seen exactly in the direction of the center of curvature of the cornea only when light forming it is reflected to the eye from the region of the sight-hole of the mirror. If the light is reflected from some peripheral portion of the mirror the reflex departs slightly from the direction of this center of curvature; and departing in different directions when the reflex and the opacity are viewed from different directions might lead to slight error. In the use of the reflex to determine approximately the relation of an opacity to the center of curvature this possible inaccuracy can be readily guarded against, and at most it is of slight practical importance if the movement be watched from a distance of ten or twelve inches, or farther.

IMAGE-CHANGES CAUSED BY ASTIGMATISM AND BY CORRECTING CYLINDERS.

BY G. C. SAVAGE, M. D.
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(CONTINUED FROM JANUARY.)

Turning the right side of Fig. 3 up, the image-changes are shown when the meridian of greatest curvature is at 45°. It is clear that, if the astigmatism is equal and of the same kind in the two eyes, the meridians of greatest curvature being parallel though oblique, the two images of a square held vertically will be distorted alike, and hence will fuse readily and completely. If the meridian of greatest curvature in one eye is at 135° and in the other at 45°, the image in each eye will be a non-rectangular parallelogram leaning in the opposite direction from the image in the other eye and cannot be perfectly fused, though an attempt at fusion will be made, in an effort on the part of the eyes to obey the supreme law of binocular single vision, the law of corresponding retinal points.

When the meridian of greatest curvature is vertical in one eye and horizontal in the other, the fusion of the dissimilar images is attempted by the recti muscles: if the upper or lower borders are to be fused it is done by the superior and inferior recti; if the right or left borders the internal and external recti do the work; but the images, though of the same area, being differently shaped can never be perfectly fused by such a pair of uncorrected astigmatic eyes. Vertical astigmatism either against, or according to, the rule in both eyes involves only the ciliary muscles; vertical astigmatism according to the rule in one eye and against the rule in the other eye not only calls the ciliary muscle into activity but also calls the recti muscles into an abnormal or complicated action.* If with such eyes, vision having been fixed on the center of the square, the observer wishes to look at the upper border, the visual axis must be turned up by the two superior recti, the visual axes in the eye astigmatic according to the rule will have to move further than the one in the eye astigmatic against the rule, in order that the image of the upper border may fall on the horizontal meridian of each retina. Thus is interfered with the normal action of the superior and inferior recti muscles, which is to keep the visual axes in the same plane. The necessity for this complicated (as contrasted with the simple) function of the recti muscles may be seen by a further

*All forms of Anasometropia demand of the recti muscles the performance of their complicated function.

study of Fig. 1: Let *a-b-c-d* be the figure seen by the right non-astigmatic eye, and *a'-b'-c'-d''* be the same object as seen by the left eye astigmatic according to the rule. By no possibility can these figures be wholly fused, but different parts can be fused at will, but only as a result of the exercise of the complicated function of the recti muscles. If the vision has been fixed at the point of crossing of the diagonals, should an attempt be made to fuse the upper border of the object the visual axis of the right eye must be elevated only to the line *a-b*, while the visual axis of the left eye must continue to move until it reaches *a'-b'*. Fusion is thus effected by the one visual axis rising above the plane of the other. In the same way the complicated functions of the lateral recti muscles can be studied, there being no astigmatism in the right eye and astigmatism against the rule in the left. In the former case the vertically acting recti must continually perform the complicated function while the lateral recti perform only the simple function; in the latter case the vertically acting recti perform only the simple function while the lateral recti must continuously perform the complicated function. If in one eye the vertical astigmatism is according to the rule while in the other it is against the rule, then the recti muscles can perform their simple function only when the center of an object is looked at. In fusing any other parts, the complicated function must be performed. Only a correction of these cases of astigmatism by proper cylinders can give to the recti muscles the privilege of performing only their simple function. Astigmatism with the meridian of greatest curvature horizontal, in one eye, and no astigmatism in the other is worse than if both eyes were astigmatic with meridians of greatest curvature horizontal, for the reason that, in the latter, images in the two eyes being similar the recti muscles are called on to do only work that is normal; while in the former, images being dissimilar from side to side, the lateral recti muscles must do abnormal work (perform their complicated function). When there is no astigmatism in one eye and astigmatism with meridian of greatest curvature vertical in the other, the condition is worse than if both eyes were astigmatic with meridians of greatest curvature vertical, for the reason that in the latter, images being similar, the recti muscles must do only normal work; while in the former the vertically acting muscles must do abnormal work (perform their complicated function). The worst kind of vertical astigmatism exists when the meridian of greatest curvature is vertical in one eye and horizontal in the other, for then images are unlike both vertically and horizontally, and therefore require of all the

recti muscles the performance of the complicated function, except when vision is fixed on the center of the object looked at.

In binocular astigmatism, the meridians of greatest curvature being parallel, whether vertical or oblique, images must be similar. This being true the extra-ocular muscles have to perform only their simple function — do such work as they must do in emmetropic eyes. The correction of such cases of astigmatism is important that the ciliary muscle may be relieved from abnormal work. In all other kinds of astigmatism correcting cylinders are needed to relieve not only the ciliary muscle but also one or more pairs of the extrinsic ocular muscles.

Fig. 4.

I have proved in this and in former papers that there is distortion of retinal images in oblique astigmatism; and that the distortion is in opposite directions in the two eyes when the meridians of greatest curvature diverge or converge above. This much is already generally conceded even by my former critics. To state that such images can be wholly fused would not be correct; but that fusion is attempted by the harmonious symmetric action of the oblique muscles cannot be denied without, at the same time, denying the existence of the supreme law of binocular single vision, the law of corresponding retinal points. The most daring would hardly deny the latter. Figure 3 shows how a square would be seen as a non-rectangular parallelogram (*a'-b-c'-d*) leaning down and in the direction of the meridian of greatest curvature, that meridian being at 135°, the eye being the right; turning the

right side of the cut up (*c'-d-a'-b*) shows how the left eye, the meridian of greatest curvature at 45°, would see the square.

The accompanying cut, Fig. 4, shows how these two images are fused by the action of the superior oblique muscles. This trapezoid is not seen as a whole by the two eyes; while *a'-b-c-d* is seen in common by the two eyes, *a-b-a'* is seen by the right eye alone and *d-c-d'* is seen by the left eye alone. Invert the cut and the trapezoid shows how a square would be seen by a pair of astigmatic eyes whose meridians of greatest curvature converge above. In such eyes the parallelogram images of the square would lean down and towards the corresponding side; and the fusion of these images into the trapezoid would be effected by the harmonious symmetric action of the inferior oblique muscles. In either of these cases the effort put forth by the two eyes is such a to completely fuse horizontal lines, as is shown in the lower part of Fig 4, or in part, as is shown in the upper part of the same figure, the unfused parts of the upper border being directly continuous with the fused. In fusing the horizontal lines, the vertical lines are made to lean more, hence the trapezoid. It is as impossible for these uncorrected eyes to fuse all the sides of the images as it is for me to explain why, in the attempt at fusion, preference is given to the horizontal lines.

These are my reasons for believing that there is harmonious symmetric action of the oblique muscles in astigmatic eyes whose meridians of greatest curvature either diverge or converge above:—

1st. In all cases in which the meridians of greatest curvature diverge above, a square figure is seen by the two eyes as a trapezoid longer side above. The lower the degree of astigmatism and the slighter the variance of these meridians from the vertical or the horizontal, the more nearly does the trapezoid figure approach the form of a square. While in these uncorrected eyes it may appear so nearly a square, that the patient will say that it is such, nevertheless it is not a square, as is shown by the fact that, after the correcting cylinders have been worn a proper length of time, these patients will always say that a square is a square when seen through the lenses, and that it is a more or less marked trapezoid when the lenses are raised, to become a square again as soon as the lenses are lowered. By all oblique astigmatics with meridians of greatest curvature converging above, a square figure is seen as a trapezoid with the longer side below, though at first they may fail to so observe. In the former class of cases a square is seen by either eye alone as a parallelogram leaning down and towards the opposite side, while in the latter class of cases each eye alone sees a square as a

parallelogram leaning down and towards the corresponding side. In my Edinburgh paper I showed how these images leaning in opposite directions were fused into a trapezoid by such a rotation of the eyes by oblique muscles as would bring the horizontal meridian of the retina of each eye into a position parallel with the upper and lower lines of the image.

2nd. Metamorphopsia through correcting cylinders approximately of the same strength, occurs only in those cases of astigmatism in which the meridians of greatest curvature diverge or converge above, and this metamorphopsia is always of a definite kind. In cases in which there is an equal quantity of astigmatism in the two eyes and the meridians of greatest curvature are parallel, whether vertical or oblique, the image-changes are precisely alike and therefore the images must fall on corresponding parts of the retinae. If the meridian of greatest curvature is at 135° in each eye, a square will throw a parallelogram image on each retina, leaning down and to the left. The two eyes together will see the square as a parallelogram leaning down to the left, precisely as each eye saw it. Fusion has been effected without abnormal action of either recti or oblique muscles, for the images had already fallen on corresponding retinal points. The proper cylinder placed before each eye at once changes the shape of the image from a parallelogram into a square, and the figure is seen as a square in both monocular and binocular vision. *There is no metamorphopsia following the correction of such astigmatics.* No muscle-habit has been formed in these cases and therefore no muscle-habit must be broken. In like manner it could be shown that the image-changes in vertical astigmatism are such that like images are formed in the two eyes. A square is converted into a rectangular parallelogram by the astigmatism and this figure is reconverted into a square by the correcting cylinders. Through these cylinders each eye sees the figure as a square and the two together see it is a square. *No metamorphopsia follows the proper correction of such eyes.* But metamorphopsia can be produced in these eyes by revolving the axes of the cylinders so that they may no longer coincide with the meridians of best curvature. Revolve both axes in the arc of distortion for the superior obliques and a rectangle becomes a trapezoid, longer side above; revolve the axes in the arc of distortion for the inferior obliques and the square becomes a trapezoid, longer side below. This metamorphopsia will never disappear until the cylinders are re-set properly; and the latter form of metamorphopsia is a source of less trouble to a patient than

the former, for the reason that the inferior obliques are better able to do the abnormal work than are the superior obliques.

Metamorphopsia always follows, for a longer or shorter period, the wearing of cylinders given for the correction of astigmatism whose meridians of greatest curvature diverge or converge above. The character of this metamorphopsia is always of a definite kind in any given case, and may be foretold. Its duration is variable, but sooner or later it always disappears if the cylinders have been properly adjusted primarially. In these cases the astigmatism converts the square into a parallelogram, and the cylinder re-converts the parallelogram into a square. Each eye alone, with the aid of the proper cylinder correctly placed, will see a square as a square, but the two eyes together will for a time see the square as an imperfect trapezoid. If the case is one whose meridians of greatest curvature diverge above, in binocular vision through the cylinders the square will be seen as a trapezoid the longer side below, a new condition the reverse of the old, hence readily noticed. If the case is one whose meridians of greatest curvature converge above, in binocular vision through the cylinders a square will appear as an imperfect trapezoid longer side above, a new condition the reverse of the old, and hence readily noticed. In either case the parallelogram images, leaning in opposite directions, have been transformed into squares exactly alike, and through these cylinders each eye alone sees a square as a square, because the axis of the cylinder accurately coincides with the meridian of best curvature. If this coincidence should not be destroyed, in binocular vision, then there could no more be metamorphopsia in these cases than is found in those cases whose meridians of greatest curvature are parallel. If it never occurs in the latter because there is no muscle-habit to be broken, its occurrence in the former must be due to the fact that there has been a muscle-habit and that it tends to persist. This habit has never been necessary in monocular vision, hence there is no disturbance of the relationship of cylinder axis and best meridian when a square is looked at with one eye, therefore it is seen as a square; in binocular vision the rotation of the eyes by the harmonious symmetric action of the obliques has always been a necessity, and the habit which has been formed by the obliques asserts itself, and when it does, there is a displacement of the best meridians, so that they no longer coincide with the cylinder axes, hence the metamorphopsia which is always observed by astigmatics of 1 D. or more. This displacement produces distortion of images the opposite to the old distortion by the astigmatism, that is, if the

images originally fused into a trapezoid with longer side above were non-rectangular parallelograms leaning down and towards the opposite side, the images now fused into an imperfect trapezoid longer side below, are non-rectangular parallelograms leaning down and towards the same side. In this case the displacement of the meridians has been effected by the superior obliques and the axes of the cylinders have been thus thrown into the arc of distortion for the inferior obliques. The moment the superior obliques lose their old habit, the meridians coincide with the axes of the cylinders and the metamorphopsia disappears. The same may be said of the inferior obliques, whose habit of abnormal action has been caused by astigmatism, whose meridians of greatest curvature converge above. In either case the metamorphopsia is new in kind, hence noticeable; but in all these cases it vanishes, usually disappearing sooner in those cases in which the meridians of greatest curvature diverge above. As soon as this new metamorphopsia disappears, the old kind can be easily brought out by raising the lenses while looking at a rectangle. It was harder to notice before, because the patient had always been accustomed to it. Now that a square has its correct shape with the lenses on, it at once appears as a trapezoid when they are raised

EPIDEMIC HEMERALOPIA AS SEEN ON THE COAST COUNTRY OF SOUTH CAROLINA.

BY CHARLES W. KOLLOCK, M. D.

Of Charleston, S. C.

For a number of years the writer has noted the prevalence of night-blindness among the negroes who live in what is called "the low country," near the coast, in South Carolina, and the rarity with which it occurs among those who live in the "up country," away from the coast. Even in the coast country it is seldom seen among the whites not a few of whom live with surroundings quite similar, if not identical, to those of the blacks. It is also interesting to note that it is nearly as rare among the mulattoes as the whites. Many explanations have been suggested as to the cause of night blindness, such as prolonged exposure to the rays of the sun and reflections from bright objects, impoverished condition from overwork, insufficient food and bad hygienic surroundings, exposure to miasmatic influences and some constitutional dyscrasias, as scrofula, syphilis, tuberculosis and the toxic effects of tobacco, alcohol, quinine, etc. It is easy to understand how sailors, longshoremen and others who are exposed to the rays of the sun for hours every day may have their retinæ affected, and especially when it is remembered that this class of men do not usually have the best of food and are frequently addicted to the excessive use of tobacco and alcohol. It is also remarkable that among this class that the blacks are affected oftener than the whites, who, as a general thing, do not bear the heat as well as the former. Night-blindness is, however, not confined to those who are constantly exposed to the sun's rays and though no age seems to be exempt it is rarely seen among women. The explanation of this is rather difficult because they frequently lead exposed lives and though not as apt to use alcohol as the men are they are great smokers and tobacco amblyopia is not uncommon among them. The female child may be affected as often as the male. Malaria may be a cause and there is no doubt but that the negroes are especially exposed to this poison on account of the localities in which they live and the water they drink. In a number of cases examined no malarial history could be elicited and microscopic examinations of the blood failed to throw any light upon the cause. Night-blindness has been more frequently seen by the writer in negro children than adults. Some of these were apparently healthy and well-nourished, but the greater number were thin, scrofulous, syphilitic and at times tuberculous. There was often a

general enlargement of the glands throughout the system. The eyes present the most peculiar and disagreeable appearances, which have been previously described by the writer in papers on the eye of the negro. In nearly all cases both of adults and children the silvery scales are found upon the conjunctiva at the outer and inner margins of the cornea and extending toward the canthi. The presence of this satin-like formation undoubtedly indicates the existence of hemeralopia, though it may not be present in every case of night-blindness, and especially is this true among the whites. The xerotic condition of the conjunctiva is never absent in the negro and is therefore pathognomonic. These cases seem to have suddenly developed too much conjunctiva which resembles greasy yellow-stained parchment that is thrown into folds and wrinkles about the cornea with every movement of the ball. These folds and wrinkles are very noticeable during convergence when the plica semilunaris, sharing in the general laxity and not unlike the membrana nictitans of birds, extends in two long tangential folds above and below the cornea. In a broad band surrounding the cornea, but particularly at the outer and inner margins, the conjunctiva is deeply pigmented, the discoloration being greater at the corneal border and fading away toward the equator. The palpebral conjunctiva is never pigmented, but is usually swollen, velvety and at times distinctly granulated in appearance. In adults the cornea is less often affected than in children, in fact it is rare to see more than a soft, grayish elevation of the corneo-scleral junction of adults. The same condition is more commonly seen in children and sometimes the conjunctiva of the cornea is also loose, and is then thrown into folds by the pressure of the lids. This condition of the cornea is usually a forerunner of ulceration and necrosis. The ophthalmoscopic examinations have generally shown, with the exception of the cornea, clear media and a dirty-white and slightly swollen nerve head with haziness extending beyond its edges to the surrounding retina. The retinal vessels and fundus are generally but little changed. A thorough study of the vision for distance, field and color has not been made by the writer so that positive statements on these points must be reserved for a future paper, but in general it may be said, that where the cornea is clear and no serious error of refraction exists, the vision is fairly good during the day for distance, with a probable concentric contraction of the fields and some confusion as to colors. Children are especially blind at night. The treatment varies: when the patient is an adult the use of tobacco, alcohol, quinine

etc., is stopped as a precautionary step; a general tonic course may be prescribed and constitutional weaknesses treated when they exist, but the remedy most to be relied upon is strychnia which should be administered in large and ascending doses. For children who are apparently in fair health a combined alterative and tonic treatment is advised, such as syrup of the iodide of iron, cod liver oil, and perhaps small doses of strychnine. Corneal ulceration requires the usual treatment with atropine, yellow ointment and in some instances with cauterisation. Eserine is useful at times when stimulation is required. Enlargement of the glands, emaciation and corneal ulceration are usually signs of approaching dissolution.

A CASE OF OPTIC NEURITIS, PROBABLY OF UTERINE ORIGIN.

BY JAMES L. MINOR, M. D ,
Of Memphis, Tenn.

Since Mooren of Düsseldorf called attention to disturbances of vision and uterine diseases, in the *Arch. fur Oph., Vol. XI., 1882*, sporadic reports of cases with such connection have appeared, but the field is still undeveloped, and one may yet present individual cases and know that interest will be taken in them if the points are as saliently brought out as they are in that which I shall relate.

Mrs. W. Aet, 28, of Alabama, consulted me January 24, 1888, for practical blindness, and the following history was elicited: Health poor for a number of years, but nothing of definite character pointed to constitutional lesion of any kind. Never had headaches. Three months ago, when three months pregnant, had a miscarriage, and has suffered from menorrhagia since. Two weeks ago, vision began to fail, and has grown gradually worse until the present time, V. $\frac{3}{200}$ in each eye. Visual fields normal, with vision relatively much better in periphery than in center. Blind to all colors. Ophthalmoscope shows, well-marked optic neuritis in each eye, disks being slightly swollen about 1.50 D. For the neuritis, I suggested the use of those time-honored remedies, mercury and iodide of potash, dry cups to the temples and general building up of the health. An important step in the latter direction being relief from her uterine disorder. She was referred to Dr. R. B. Maury of this city, who found a lacerated cervix with everted lips, and retained organized placenta of a three months pregnancy. He first curetted, and that stopped the hemorrhage. Two weeks later the laceration was operated upon and soon after that the vision began to improve. I next saw and examined her about the middle of March 1888 and found V. $\frac{20}{20}$ in each eye. Visual fields normal; color perception normal. The optic neuritis had entirely disappeared. My recollection is, that the medicine suggested by me, was not taken during her sojourn in Dr. Maury's Sanitarium, and as she could see when she left it was not begun again, hence she got well without it, and because of her being relieved of her uterine difficulty, which had evidently caused her eye trouble. I heard of this patient, for four or five years after this, and know that she continued to enjoy good health and freedom from return of eye trouble.

ON ASTHENOPIA AS A FATIGUE NEUROSIS AND ITS ANALOGY TO THE PROFESSIONAL NEUROSES.

BY WILL WALTER, M. D.

Of Chicago.

We owe much to Dr. Weir Mitchell and to Dr. Thomson, who first pointed out eye strain as a cause of headache.

The careful study of refractive anomalies has so far relieved our patients of the accommodative strain that in the event of a recurrence of the symptoms or their occurrence in the absence of the former, we turn more and more to the extra ocular muscles for the cause.

Dr. Morris J. Lewis has aptly given the name copo-dys-cinesia—fatigueing, difficult or painful motion—to cover the affections known as occupation neuroses, professional neuroses, incorrectly named writer's cramp, telegrapher's cramp, etc., from the class of workers in which they occur rather than from the anatomical structures in morbid action. (We shall use the term dyscinesia as perhaps as expressive.)

That which has in past years been given most study is writer's cramp or Schrivener's palsy and will serve as the type in our brief review of the various factors of interest in dyscinesia, the analogy between which and so-called asthenopia it is our purpose to study.

Rather it is our desire to call attention to the analogy in order to determine whether the latter is indeed a form of the former; having ascertained that, to later study into the generating conditions of dyscinesia in all forms.

And while analogy may not be argument, an analogical reasoning may aside from its argument as such, aid in the solution of problems otherwise impenetrable by diverting a line from special to general thought or may by its argument turn investigations of an area more available for study to good account in the explanation of phenomena of a neuro-muscular mechanism the surroundings of which while necessary to their perfect action in health are still preventive to direct examination in disease.

We therefore ask justification for calling attention by review to many facts which will to most appear self-evident; and as some may not have recently gone over this subject in neurology, I will be rather full in my digest.

Writer's cramp is defined by Dana as a "chronic functional neurosis characterized by spasmodic, tremulous, inco-ordinate disturbances when the act of writing is attempted and associated with feelings of fatigue and pain."

Affecting clerks and professional men in the majority, ranging in years from 20 to 40, predisposed by inheritance or by a general tone lowered by sexual excesses, by disease or by poor hygienic environment, its chief exciting cause is ascribed to excessive writing, especially under mental strain and often in cramped positions.

Gradual in its onset the primary symptoms of stiffness, weariness and easy fatigue are merely noted as transitory effects of temporary indisposition; latterly one of several forms may develop or a compound of two or more in varying proportions, viz.: *Spastic*, according to Dana, Lewis and others the most frequent, in which the flexors, occasionally the extensors, are thrown into a state of contraction usually tonic, accompanied by inco-ordination for writing while the muscles may be used for other movements without much discomfort;

The *Neuralgic* or painful type, in which fatigue and pain are added to the spasm;

The *Paretic* form, according to Wood and other observers the most usual, wherein attempt to write is accompanied by great weakness and fatigue extending often to the whole arm or even to a general sense of excessive weakness; occasionally a banded sensation in the wrist is complained of; (Lewis states that "this form occasionally follows the spastic, or it is seen in those cases where the cause of the trouble has been a preceding neuritis, or it may be due to professional muscular atrophy as described by Onimus");*

The *Tremulous* form, accompanied by unsteadiness and tremor which may involve the whole arm in an intention tremor and which is looked upon by Dr. Lewis as a premonitory sign of professional muscular atrophy.

Vaso motor and *trophic* symptoms are described as common and are of importance. The former consist of active or passive congestion, accompanied by sensations of heat, formication, prickling, occasionally by hyperæsthesia and often a chilblain appearance, due to a local asphyxia.

Early in the painful type upon cessation of work the pain remits to recur on return to the work but if the acts be persisted in under the same conditions the pain becomes more or less constant often severe and extending upward to be felt even between the shoulders. Cases have been described as purely mental dyscinesia and many of the sufferers complain of insomnia and vertigo—are mentally depressed and often emotional. Where the *individual* muscles have been

*It has been observed that a paretic condition of one muscle may coincide with a spastic condition of another not its opponent.

carefully studied constant electric changes have been found related to the symptoms presenting. Thus: "In those cases where spasm of one or more muscles is a more or less marked symptom examination shows, both to the faradic and galvanic currents a quantitative increase in the reaction, both in the nerves and muscles; when *paresis* is present there will be a quantitative decrease in the reaction. In the same arm some muscles may show a quantitative increase and others a quantitative decrease."—(Lewis.)

Pathologically the disease may be said to present no demonstrable lesion. This gives it a place among the functional neuroses and hence there early arose theories and the theorists became divided as to the central or peripheral origin.

Erb and Duchenne at the head of the great majority of workers held to the earlier view of the central origin and called it irritability of the nerve centres, Wood maintaining that the disease may be looked upon as a local neurasthenia; a few consider the later theory of the primary peripheral origin which by "abuse may become central, spinal," while "Roth considers that there are two entirely separate classes, the central and the peripheral, or local."

Facts of particular note are that if the affected arm be displaced by the other, like symptoms soon develope in the second, and that the power of the muscles remain little impaired for any coarser mechanism though immediately showing symptoms in the more finely co-ordinated movements; both arguments adduced in favor of the difficulty lying in the co-ordinating centers in brain or cord. Some have presented neuritis but are said not to be typical forms of of dyscinesia.

In treatment rest is considered necessary; yet even after prolonged rest the symptoms have been known to recur in increased severity as soon as the use is resumed.

Gymnastics may be said to hold first place. Exercising the muscles daily for periods of twenty to forty minutes both without and with resistance, extending, flexing, adducting, abducting the fingers, carrying the work on rhythmically over the finger and thumb groups of muscles, the ingenious system formulated by the writing-master Wolff.

Daily massage upward, both kneading and percussion, with nerve effleurage likewise upward, and even to the cervical plexus, are added.

The faradic current is considered as possibly harmful in most cases. "The best application is the long continued use of a mild current

of galvanic electricity passed down the nerve of the affected member of just such strength as to be distinctly but not painfully perceived."—(Wood.)

The conjoint movement of writing in which the work is little complicated and only the larger groups used, larger holders, coarser pens, the use of typewriters, all prophylactic measures are likewise recommended in the treatment. It is interesting to note in the history of the treatment that tenotomies of tendons were early instituted and some cures reported, though they were likewise early abandoned.

Lastly in the cerebral type the anti-neurasthenic treatment of rest in bed and forced feeding has been inaugurated with good effect. Strychnine, atropine, cannabis indica and alteratives constitute the medical therapeutics.

As to the neurologists prognosis, the concensus of opinion seems to be that it is essentially a chronic affliction and once established a distinct predisposition to the disease is present.

The gradual shortening of hours for bookkeepers and telegraphers and the almost complete substitution of the typewriter for copy work and correspondence, the improved hygienic surroundings of clerical workers have all contributed to reduce the prevalence of writer's cramp. Still neurologists state that dyscinesia is by no means uncommon, though writer's cramp furnishes a relatively small per cent compared to a few years ago.

Bearing in mind the fact that in the evolution of the higher functions of life the integrity of the fundamental plan is maintained though its lines are not always apparent, we are not surprised to find that the eye in its motions finds its homology in the lower muscle groups and is comparable to the motion brought about by any group of muscles over a ball joint; the sclera being the supporting framework of the eye serving for the attachment of muscles for motion as the femur for instance serves for the insertion of the muscles of the thigh operating in the acts to which it is adapted, the fixed point in the former being the orbital walls, in the latter the pelvic bones, the posterior outer wall gliding over a smooth and almost frictionless "union," practically analagous though far surpassing in the freedom of movement the mobile hip joint.

So also it has seemed to me that accommodation is in reality an act of prehension and as Poore has divided the act of writing into three acts, that of prehension, that of poising the hand and arm and that of moving the pen, so may we liken the first to accommodation,

the second to convergence and the third to associated movements in the act of reading.

We shall use the term asthenopia in its broadest interpretation, adynamic vision, covering both accommodative and muscular asthenopia, painful and not painful, though many observers interpret it to mean painful vision.

We find writer's cramp more common among men because they have been in past years in the majority in the causal occupations. The general belief is that asthenopia is more prevalent with women and this we expect from their habits of life.

And while presenting the same predisposing causes, a low general physical tone, inherited or acquired, the eye presents the further proneness to inco-ordinate action through demonstrable abnormal development.

This is the age of the development of the intellect through the medium of the special senses. For any point within 200 feet the activity of the ocular neuro-muscular mechanism is called into play. In housewives, whose work is so generally in the home circle, or among students, stenographers, typewriters, shop-girls and factory girls, there are few if any hours wherein this mechanism is suspended, its action ever varying within a few feet, more complicated and exacting as the work is nearer or finer, the eyes oscillating through various planes, even prolonged into late hours through manifold duties or social obligations or pleasures.

Among men as a class the demands upon the mechanism while not so exacting are in many present.

If upon this work is engrafted abnormal development as in heteropia or heterophoria, the mechanism is brought into play when the eyes are fixed even at the greatest distance and a load is added whose weight is greater as it is longer carried or further lifted.

From the symptomatology presented in asthenopia it is not difficult to formulate varieties for comparison, nearly identical to those presented in dyscinesia. As in one so in both the border line it is impossible to draw.

There are cases presenting, though not frequently, where asthenopia consists merely in a blurring of vision, at first transient, but later if the cause be not removed becoming constant; this may be called purely *spastic* asthenopia, and it may occur in patients presenting high abnormalities who are non-neurotic, though it may happen in low degrees upon a neurasthenic disposition and be the precursor of the

later developing neuralgic type. Generally however—and this is the usual acceptation of the term asthenopia—it is combined with the *neuralgic* as evidenced by the pains and reflexes so well known. Many of the disturbances of the muscular balance are relieved by refractive correction, but purely muscular asthenopia is unfortunately common. Indeed it is upon the etiology of this the conflict is to-day, the etiological source supplying the therapeutic measure; and we must come to understand that, once accommodative asthenopia of the neuralgic type has arisen a distinct disposition to muscular asthenopia of like forms persists and will certainly supervene if the same abuse and causal conditions continue. While a *tremulous* condition is present in some neurotic cases in my rather limited experience it is scarcely in sufficient prominence to form a distinct type.

The *paretic* type is instanced by the cases presenting wherein there is purely muscular debility and sensations of painful weakness.

The history of our somewhat empirical treatment of asthenopia of the muscular type is somewhat similar to that of the fatigue neuroses and we now find the field occupied by two broad classes which may almost be styled medical ophthalmologists and surgical ophthalmologists; and these are slowly drifting together and making a larger class of conservatives.

To prove such a disadvantageous variability in the balance of the arm muscles in the act of writing as it has been possible with the eye groups is however not easy, though it has been possible to prove approximately their comparative strength.

Nevertheless it is easy to see that in that position of writing, for instance, where the penholder drops below the first metacarpal bone, wherein what is termed in mechanics a toggle joint is formed, causing a drawing together of the first and second phalanges in a tighter grip (Lewis), or where the finger movement is used causing the tendons to operate over more acute and hence more frictional angles, or where cramp positions are assumed by incorrect relations of the lines of writing to the arm and slope of the letters, in all these greater neuromuscular energy is used and that they bear a closer relation to the additional strain upon the ocular mechanism above mentioned. It is also clear that while the former is easy to desist from when the particular work is over the latter is called into play through all the hours of waking.

With the usual references to improper use (and we have in mind both the incorrect methods of writing and ocular abnormalities) is to

be mentioned the fact that extra mental effort and special direction are necessary to muscular work done under such conditions and in this connection is to be added the use of the eyes for very fine work in dim or flickering light or reading in moving carriages or in a reclining posture.

We endeavor to recall to mind the analogy of functional activity as well as the homology of anatomical structure between lower muscle groups especially of the forearm and the neuro-muscular mechanism of the eyes; to establish the lines of similarity between the effects of excessive use upon the two mechanisms and the causes predisposing to these effects as analogous; to show that the treatment consists with both in removing the peripheral strain, the use of like medicinal remedies, of electricity and of gymnastics, probably at present the most important factor in the latter as well as the former. We are led to conclude that the corollary is a true one.

If it is granted, the fact that the great mass of authority in neurology is that dyscinesia is a disease of central origin, an irritability or a neurasthenia of the co-ordinating centers, is of particular interest to us here.

It would also seem that the results of electric stimulation which have served to show us variability in the reactions probably coincident with definite functional derangement in the study of dyscinesia, especially the opinion of Poore, "that increased irritability shows an early and decreased irritability a late stage of the same condition," should lead us to the greatest conservatism and exhaustive and prolonged study of individual cases before attempting alterations in tension of the less easily studied ocular muscles.

It also seems that we may with propriety, in lieu of a confessedly poor word, asthenopia, substitute *ocula-dyscinesia* (intra-ocular or extra-ocular as the case may be) and thus give it a place in nosology with dyspnoea, dysphagia, dysmennorrhœa, dysorexia, dysosmia and like terms; all of which serves it is true only for provisional diagnosis, though as such they will always be valuable.

If upon this subject neurologists and ophthalmologists occupy common ground, we may hope that by enlisting their work from this view point study into the primary causation of asthenopia will be productive of better results.

*BINASAL HEMIANOPSIA, WITH THE REPORT OF AN ADDITIONAL CASE.

By CLARENCE A VEASEY A.M., M.D.,

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Cases of binasal hemianopsia are of such infrequent occurrence that a report of the following may be of interest.

Mrs. L. L., widow, aged 54 years, consulted me concerning the condition of her eyes in April, 1896. She had first noticed that her vision began to fail five months before this time but the failure had been gradual and at no time had there been any severe headache or neuralgia. She recalled that seven months before I saw her she had a spell of nausea and vomiting that lasted about three weeks, the vomiting occurring always in the afternoon or early in the evening and never accompanied by any headache. During this period she sometimes vomited daily; sometimes every second or third day. There was occasionally a slight dull feeling in the temples, or over the brows, but this was never present in the morning. She had had her glasses frequently changed by an optician within a few months but was able to see with each pair for a short time only. Three weeks before consulting me, according to her statement, her eyes suddenly became very much worse as she had been able to do some sewing until this time. When she was first seen there was present the characteristic stare and facial expression of a partially blind person and she complained that there had been some numbness and heaviness in the left leg for two weeks, although an examination at this time failed to show anæsthesia of any portion of the body. There was also some tremor of the head and limbs and occasionally slight vertigo. No family history of syphilis or tumors of any kind could be elicited, and there was no perceptible impairment of memory, speech or hearing.

Examination showed both pupils equal in size, 6½ millimetres in diameter and reacting to light when reflected directly upon them from the front, to convergence and accommodation though the response was exceedingly sluggish. The bulb was not congested and there were no external evidences of inflammation, although at times there had been attacks of photophobia. The vision of the right eye equalled light perception; that of the left eye equalled $\frac{1}{180}$ M. The tension was normal in each eye. An ophthalmoscopic examination revealed the following conditions:

O. D. The cornea was clear; the vitreous was filled with cholesterin crystals which moved swiftly about upon each movement of the eye-ball forming the condition known as *synchisis scintillans*. The disc was oval; its edges everywhere veiled. There was a large stellate-shaped arrangement of glistening white streaks and spots surrounding the macula, and a few smaller spots between the macula and the disc. The latter was decidedly pale as seen through the hazy media and there were two small flame-shaped hemorrhages on its surface, one on the upper and inner, the other on the lower and inner quadrant. The arteries were markedly diminished in size, some of them being mere threads, those on the nasal side of the disc being much smaller than those on the temporal side. There

* Read, by invitation, before the January, 1897, meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia.

were three small hemorrhages down and out from the disc along the course of the inferior temporal vein.

O. S. There were no cholesterin crystals in the vitreous but the latter was slightly hazy, the disc oval and very pale. In the macular region there was no such disturbance as existed in the other eye, though a few small buff colored spots were seen in various portions of the fundus. There was a small flame-shaped hemorrhage on the lower outer quadrant of the disc. The arteries were smaller than normal, though not so markedly as in the other eye, and those on the nasal side were also smaller than those on the temporal side.

An examination of the urine showed the total quantity passed in 24 hours to be two pints, the specific gravity 1018, the color pale amber, but no albumin, sugar or casts could be found though several specimens were examined.

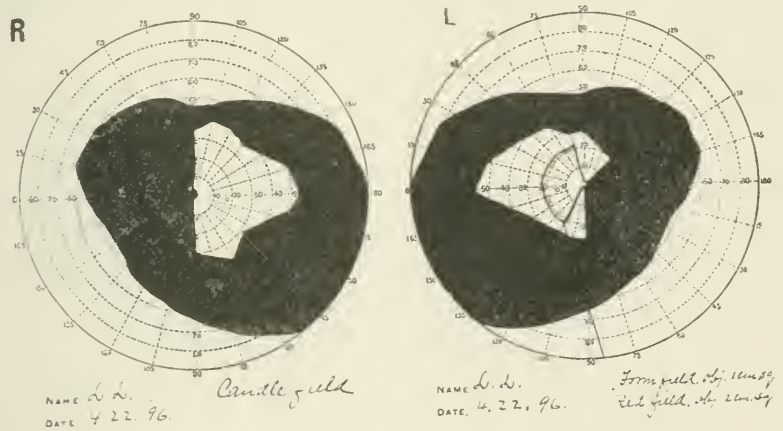

Fig. 1.

The blood examination revealed no parasites but the amount of haemaglobin was only 58% of normal.

The fields of vision, as seen in Fig. 1, showed binasal hemianopsia. That of the right eye was taken with candles, the point of fixation being 4° to the temporal side and the macula being included in the blind half. The line of demarcation between the blind and the remaining portion of the field was distinctly vertical. That of the left eye was taken with a grayish-white object, 1 centimeter square, and the preserved portion of the field extended in the upper part, some on the nasal side. The macula was included in the preserved half. The color field for red, taken with an object 2 centimeters square, presented a somewhat different form, being fan shaped, including the macula, and here the blind part encroached slightly above and below, on the temporal side. No other color could be recognized. The preserved fields in each eye were concentrically contracted. There were no scotomata. Wernicke's hemianopic pupillary inaction was present and the knee jerk was diminished.

Dr. George E. de Schweinitz very kindly saw the case in consultation, and we decided the best treatment to be pursued was to administer mercury in the form of inunctions, to give rapidly increasing doses of potassium iodide and in addition small doses of nitro glycerin.

The patient remained under observation for one month at the expiration of which time the vision of the right eye equalled the counting of fingers at twelve inches excentrically, while that of the left eye equalled $\frac{2}{40}$ M. Despite the increase in the visual acuity the fields of vision were gradually becoming more and more contracted still preserving their hemianopic shape, as can be seen in Fig. 2. She insisted upon returning to her home in the South, notwithstanding the gravity of her case had been pointed out to her, where she died three weeks later. No autopsy was obtained but her attending physician wrote me that she was going around in about the same condition as when I saw her until four days before her death. At this time she became extremely nauseated and there were frequent attacks of hard vomiting and severe muscular twitching in various parts of the body. Two days before death she entered a semi-comatose condition which became complete twenty hours before death and during which there were involuntary evacuations of the bowels.

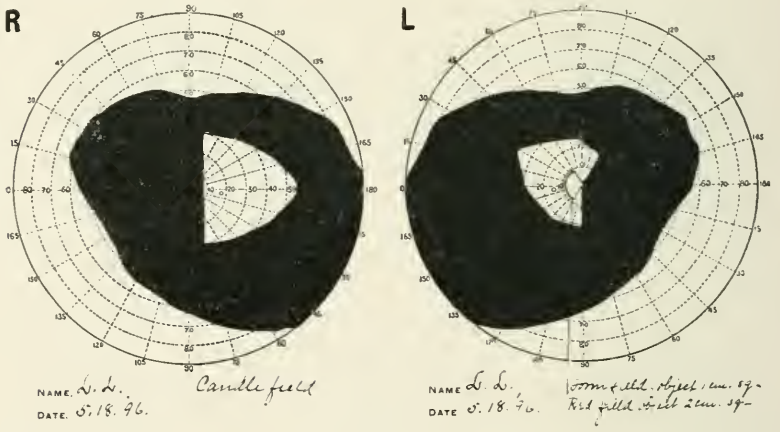

Fig. 2.

The literature of binasal hemianopsia has been partially gone over very recently by Fridenberg (1) who added a case to those already recorded.

His patient was a man who eighteen months before consulting him had struck his head in coming up the stairs from a cellar. The blow was severe enough to cause him to stagger but he did not lose consciousness. Six months later he noticed that he could only see "toward the outside" The patient was red-green blind Ophthalmoscopic examination showed grayish-white discoloration of both discs, without noticeable excavation, and contracted vessels. His hemianopic condition did not improve.

In his paper the author reviews one case that had been reported by von Graefe [2], four by Mandelstamm, [3 & 4] six by Daa, [5] occurring in members of the same family, and two by Knapp, [6] The other recorded cases are one by Schmidt and Wegner [7], one

by Herschel, [8] one by Ole Bull, [9] one by Eskridge, [10] one by Lang and Beevor, [11] and one by Eales, [12].

The case recorded by Schmidt and Wegner was a female, aged 23 years. Slight edema of the ankles had existed for one year but prior to this the general health had been excellent. During this year there had developed headache, dizziness and vomiting and there was some disturbance of the visual acuity. The patient was anaemic. An examination of the urine showed the specific gravity to be 1009, the total quantity passed in 24 hours being 2600 c c., but there was no albumin Some disturbance of menstruation also existed, this having been regular in all respects up to the beginning of the series of symptoms one year before. The pupils were widely dilated and the reactions sluggish. Ophthalmoscopic examination showed what was presumed to be the typical picture of albuminuric retinitis. The papillæ were swollen, the edges veiled, and there were numerous hemorrhages and whitish spots throughout the fundi. O. D. V. equalled the reading of Jaeger 17 at 5½ inches. O. S. V. equalled the reading of Jaeger 21 at 6 inches. There was binasal hemianopsia and excentric contraction of the remaining portion of each visual field. The case was thought to be one of albuminuric retinitis though no albumin was ever found in the urine at any time. There was no cardiac hypertrophy. The memory and intellect remained good but the vision gradually became less acute. There was an epileptiform attack lasting ten minutes a short time before death, the patient later becoming unconscious and attacked by excessive vomiting.

The autopsy revealed a tumor about the size of a pear situated in the middle of the left ventricle extending to the upper and external portion of the roof of the ventricle and lying loosely on the large ganglia. The optic thalamus was flattened and atrophied. The growth extended into the third ventricle involving the septum lucidum, the fornix and the external layers of the corpus callosum. In the right lateral ventricle from the middle part of the anterior horn down to the entrance of the posterior horn there was a tremulous cyst that very loosely pressed on the large basal ganglia of this side. The latter showed no change in shape, but the anterior corpora quadrigemina was markedly thinned and flattened. The aqueduct of Sylvius was so widely dilated that a large sound could be passed through it. The fourth ventricle was also dilated and the superficial blood vessels, as in the lateral ventricles, were larger than normal and contained blood.

The dura mater on both sides was somewhat oedematous. In the optic nerves there was some increase of fibrous tissue and some of the fibers were atrophied. The retinæ were swollen and contained numerous irregular ecchymotic spots, none, however, being found in the macular regions. The tumor proved to be a telengiectatic gliosarcoma.

The case of Herschel was a female, aged 30 years, who a short time before had fallen and remained unconscious for awhile. Consciousness returned, however, so that she was able to understand when spoken to and the following day she attended to her housework. From this time on she suffered from periodical pains in the arms and legs which at times were so severe that she was obliged to go to bed. There was also some pain in the head. Sensation and co-ordination were normal The visual fields showed binasal hemianopsia, the line of demarcation passing vertically through the macula. The pupils reacted promptly and

the ophthalmoscope revealed atrophic discoloration of both discs, especially on the outer halves. O. D. V. $\frac{20}{20}$; O. S V. equalled $\frac{4}{200}$. There was red-green blindness in both eyes. The author assumes that the hemianopsia is due to the apoplectic attack, though not noticed for some time afterwards, the hemorrhage being much greater on the left side. As the patient was exceedingly dull intellectually it was thought that the condition existed immediately after the attack but remained unnoticed until later.

Henschen, [12], records a case in which nasal hemianopsia existed in the right eye, the left being totally blind, where the pathological examination revealed a gummatous exudate surrounding the chiasm, and this to a certain extent is analogous to the case of von Graefe where there was found a gumma extending from the base of the brain into the optic foramina.

Bull's patient was 44 years of age and had been in good health until three years before. Since then had been having headache which increased in intensity. In addition there was great bodily weakness. There was present a congenital defect of the fingers of each hand and the patellar tendon reflexes were absent The patient swayed when standing with eyes closed, but the gait was not ataxic. Ophthalmoscopic examination showed atrophy on both sides. O. D V. equalled $\frac{1}{18}$; O. S. V. equalled $\frac{1}{18}$ (dull day). The green and red were recognised as gray, though red was properly recognised through a glass of this color. Injections of strychnia were employed for a time and the vision was somewhat improved, in O D. equalling $\frac{1}{2}$; and in O. S. equalling $\frac{1}{2}$. This lasted for short time only and the patient became so weak that permanent confinement in bed was necessary, during which time the visual acuity gradually decreased and the visual fields became more and more contracted. Death ensued in a few weeks.

The autopsy revealed nothing abnormal macroscopically. Microscopically the tracts as well as the optic nerves were degenerated, and this degeneration had progressed to a greater degree in the former. In the optic nerves there were no fibers visible peripherally, but there was a bundle found 2 centimeters behind the eyeball, near the middle which was larger on the left side where it amounted to about half the diameter of the normal nerve; on the right being only $\frac{1}{3}$ or $\frac{1}{4}$ the normal size. At the same time the trabecular tissue had degenerated peripherally, especially on the temporal sides, In each tract there was found a small bundle of preserved nerve fibers, much smaller in circumference than the bundle in the nerves, and these were situated, not in the centre, but peripherally. The author thinks that these bundles correspond with the bundles in the nerves themselves and concludes from this that the macular bundle does not lie, as some observers claim, in the middle of the tract.

The same author states that he has observed two incomplete cases, both with disease of the spinal cord.

The case of Eskridge was a male Swede, aged twenty-three years, whose occupation was that of a track-walker. He had suffered from headache off and on for nine months, and for two months before the examination had very severe attacks, lasting for more than a week at a time, preventing sleep, and occasionally being accompanied by a vomiting spell that occurred usually in the morning. It was understood that a short time before he had been unable to walk or stand without assistance but after taking large doses of potassium iodide and mercuric bichloride he had been greately improved.

The vision of O. D. equalled faint object perception on the temporal side, the nasal side being blind. The pupil was widely dilated and the ophthalmoscope showed marked papillitis, with narrowing of the arteries, distended veins and abundant exudate which completely covered most of the vessels as they passed over the disc. The swelling was about 7 dioptres. Vision O. S equalled faint light perception on the temporal side, the nasal side being blind. The pupil was about the same size, or a little larger than the right. Ophthalmoscopic examination showed marked papillitis and beginning atrophy, with arteries very small and veins less distended than in the right eye, and considerable exudate, the swelling being equivalent to 6 dioptres. Wernicke's hemianopic pupillary inaction was present.

The patient continued rational most of the time preceding his death which occurred about six months after the examination was made. For a few weeks before this occurred there had been noticed dysphagia, weakness of the entire body, almost continuous bleeding from the gums, congestion of the left eye, and marked retraction of the head. He first lost control of the sphincters of the bladder and rectum during the night but for two months before death the loss of control existed during the day as well.

The autopsy showed a tumor in the left lobe of the cerebellum, which had extended forward and toward the median line, and evidently before death had exerted pressure upon the pons and medulla. The pia surrounding the optic chiasm was greatly thickened, and had pressed upon the optic nerve and chiasm. The tumor was encapsulated and proved to be a gliosarcoma."

Lang and Beevor's case was a female, aged 33 years. The vision had been failing for two years and she had been unable to read for eight months. For several weeks there had been rheumatic pains in the legs.

The patient could not walk toe and heel along a straight line. No incoordination in the hands. The sphincters were not affected and the knee jerk was absent. The pupils would not react to light but did react to accommodation. Movements of the eyeball were normal; O. D. V. equalled $\frac{6}{24}$; O. S. V. equalled $\frac{5}{60}$. There was optic atrophy of both discs, binasal hemianopsia and the patient was red green blind.

The vision gradually became worse.

The case recorded by Eales more resembles my own case than any of the others.

A male, aged seventy-five years, had been having gradual failure of vision for eighteen months following a long period of ill-health. There had also been failure of hearing for two years. There was no history of syphilis, and there had been no headache or vomiting. The vision of O. D. equalled $\frac{6}{9}$, that of O. S. equalled $\frac{6}{12}$ with − S. 1 D. Both discs were filled in and presented a grayish yellow appearance. There was loss of definition of the margins as if an interstitial neuritis of a chronic, not very severe type had been going on for some time. There was no swelling, the retinal vessels were practically normal, and around each disc there was an irregular ring of choroidal atrophy confined to the superficial layers. The optic nerves showed no evident signs of atrophy. A mitral systolic murmur and a chronic cystitis were found to exist. An examination of the ears revealed disease of the labyrinth. The visual fields showed binasal hemianopsia a large portion of the upper part of the temporal half being included

in the blind half. Wernicke's hemianopic pupillary inaction was present in both eyes. The patient received treatment for two months, during which time the visual acuity improved somewhat and the visual fields gradually grew smaller. There was some concentric contraction of the temporal fields from the beginning but this steadily increased.

In commenting upon this case Gowers says "The case suggests to me a bilateral inflammation of the trunks of the optic nerves in front of the chiasma, extending to this, and chiefly intense symmetrically at each side of the chiasma. The symmetry of interstitial inflammation in the nerves and nerve-centres is remarkable. I think that nasal hemianopsia has never been due to disease behind the chiasma, and I cannot conceive that it could be thus produced. That the disease is there is strongly supported by the extension of the loss across the middle line above, while the fact that this extension is greater on one side is what we should expect since inflammation, although symmetrical, is seldom exactly so.

The progressive diminution in the field is what would be expected from cicatricial contraction of the new tissues—it is quite unlike the effects of a growing tumor."

These remarks from so eminent a neurologist, seem to me to apply equally well to my own case so that further extented comment is unnecessary.

It is interesting to note, however, that in my case the macular region in the right eye was included in the blind portion of the field, while in the left eye it was included in the preserved portion, a circumstance which it seems to me would indicate that on the right side the inflammation had extended sufficiently far to involve the macular fasiculus while on the left, the latter had not yet become attacked, a view further supported by the fact that in the right eye the line of demarcation between the preserved and blind portions of the field was a vertical line while in the left eye this was not the case, a small portion of the preserved field extending beyond the median line into the nasal portion thus showing that a few of the fibers supplying the temporal side of the left retina were yet uninvolved.

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CORRESPONDENCE.

A CLINIC BY PROF. FUCHS OF VIENNA.

Reported for the Ophthalmic Record.

BY L. D. BROSE, M. D., PH. D.

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Case I.—A woman, 22 years of age, who for the past three years has suffered from palpitation of the heart, is easily excited and frequently absent-minded. During the day the eyes water (epiphora) and a catarrhal condition is easily set up. On inspection it is noticed that the eyes are unusually prominent and staring. The upper lid is higher and more retracted than normal and does not follow the eyeball on looking down. In addition there is found to be a marked enlargement of the thyroid gland. She has been treated before in this clinic with electricity and medicine taken internally and, at the same time, one eye being more prominent than its fellow, a tarsorraphy was done to enable her the more readily to close the lids over the exposed cornea.

This patient's disease is termed "*Morbus Basedow*," and is as a rule slow in its development. Women suffer from it more often than men. Generally the patients first complain of being easily excited and upon slight provocation they suffer from palpitation of the heart. They gradually become emaciated and the neck enlarges, a bronchocele develops. The eyeballs gradually become more prominent, so that during sleep the lids do not wholly cover the cornea. The exophthalmos is nearly always occasioned by an overfilling of the blood vessels in the fatty connective tissue at the back of the orbit. The eyeballs themselves are not enlarged, but there is a venous stasis in the orbital connective tissue causing it to become turgid. After death as a rule the eyeballs recede. Still, true hypertrophy of the retrobulbar tissue may occur, and in such cases the exophthalmos remains after death. We can measure whether the eyes are unduly prominent or not by allowing a ruler to rest upon the lower and upper orbital edge, it will not come in contact with the cornea if the eyeballs occupy their natural position.

On account of the insufficient lid protection during sleep the corneal epithelium desiccates is exfoliated and ulceration and inflammation ensue. The lower part of the cornea suffers most, because during sleep the eyes are rolled upward under the upper lid leaving that part of the cornea exposed to the atmosphere. This upward rotation of the eyeball during sleep may be seen in a sleeping child by gently raising the upper lids, also in some thin skinned people the eyeballs may be seen under the closed lids.

Our patient has two small superficial abrasions of the left eye just above the upper pupillary border.

In Basedow's disease there is a loss of the natural involuntary blinking eye movement and the act becomes purely a conscious voluntary one and is far less frequently performed than usual, as a result, the cornea is liable to injury from dust, foreign bodies, as well as from wind and drying from the atmosphere. This condition is known as Keratitis post-lagophthalmos and saturated opacities in the lower part of the cornea are frequently indicative of a severe past illness, such as typhoid fever. The old name of Keratitis neuro-paralytica is incorrect, since in paralysis of the nerves if you artificially close the eye and prevent desiccating and injury from taking place no disease of the cornea follows.

Von Graefe was the first to point out that the upper lid does not follow and move down so quickly as the eyeball and even while moving downward in the act of downward vision, it will frequently be spasmodically raised, exposing a wide white scleral margin. This is due to the muscle of Müller being constantly in a state of tonic contraction and which from its attachment to the tendon of the lavator palpebræ and the retro-tarsal sulcus strives to retract the upper lid. The exophthalmos occurs slowly, as a rule, but may result, after fright, in one night. It may be limited to one eye, when there may be some difficulty in making a diagnosis. Since the greatest danger to the eye is from corneal exposure, at night upon retiring we instruct the patient to apply a bandage. However, where the disease is very chronic and of high degree it is best to resort to tarsorraphy. In applying a compress and bandage for the night great care must be taken that the lower lid is approximated to the eyeball so that it will be impossible for the cotton to come in contact with corneal surface. The treatment of the local eye condition in our patient will be a bandage at night and atropine instillation.

Case II.—Is a patient with great swelling of the left eyelids and with some protrusion of the eyeball. The man is a school teacher, 34 years old and says that the trouble began twelve days ago with aching pain in the upper orbit. There is great swelling and œdema of the lids, so that the patient cannot voluntarily open them. Underneath the swollen lid the conjunctiva is congested and highly chemotic, the eye movements are restricted, but the eye itself remains healthy. On deep digital examination between the upper part of the globe and the orbital wall, we find a sensitive more resisting spot due to a periostitis. The cause of the disease, however, is obscure, the man denying all evidence of syphilis, nor can we get a history of tuberculosis. Likewise does he fail to recall an injury at this spot. Warm applications were ordered and iodide of potash administered. Three days later pus was spontaneously evacuated from under the upper lid, and on introducing a probe roughened bone was found, thus corroborating the diagnosis of orbital periostitis.

REVIEWS.

Congenital Opacities of the Cornea.—By P. N. Barbacheff, Professor of Ophthalmology at Kharkow, Russia, *La Clinique Ophtalmologique, October, 1896.* The comparatively few observations made concerning this condition, and the exception of the nature of the case which Prof. Barabacheff reports, add to its interest and make it worthy of a careful study.

The patient, a new born child, weighing about eight pounds eighteen inches long, whose general appearance was that of a premature or ill nourished child, having the skin of the hands, face and feet very much wrinkled and icteroid. It exhibited on examination the following points of interest: *Lids* much swollen, cyanotic and turgescent; on separating the upper from the lower an abundant cloudy secretion ran out. The superior tarsal conjunctiva was covered by a yellowish membrane which was readily removed in part. The conjunctiva lining the cul-de-sacs was swollen and red. The bulbar conjunctiva oedematous, presenting a true picture of chemosis The corneae were lustreless and seemed covered with small punctures. On each were distinctly seen grayish spots which assumed in the R. E. the shape of an oval five mm. long, reaching as far as the pupil; while in the L. E its shape was that of a rounded segment four mm at its base, not quite reaching the inf border of the pupil. The epithelium was intact and the curvature of the cornea showed no abnormality.

It seemed, the author says, that I undoubtedly had before me a severe case of purulent ophthalmia, but the corneal opacities could not be directly connected with it.

The mother, it is true, was suffering from leucorrhoea. The child had been born two and one-half weeks before term, and propably on account of an early rupture of the sac the labor had been a tedious one. Two hours after birth the midwife had noticed the suspicious suppuration and had instilled a solution of $AgNo_3$ (Credé's method).

It might be supposed at first that the corneal nebulæ and the inflammatory reaction had been produced by the careless instillation of the silver solution on an abraided cornea, or that the solution could have been harmful to the cornea of a premature child suffering from icterus. At any rate the grave blenorrhoea was a serious and dangerous complication.

The cul-de-sacs were carefully washed with formaline (Merck) 1-2000, atropine was used and frequent lavage as well as constant ice compresses were prescribed. Under the treatment the eyes improved greatly, and after the third day a 1% sol. of $AgNo_3$ was instilled, followed later by a 5%, then a 3% until the eighth day, when all sup-

puration disappeared. The corneae became clear and brilliant even over the gray opacities, which meanwhile grew rather worse. On inspection with the lens they were localized in the deeper layers, and by oblique light only, they seemed made up of groups of dots and striæ. The anterior chambers and irides were normal.

Irrigation with formaline 1-2000 and boric acid 4% were continued. The opaque places remained the same until the twelfth day, when, by means of the lens, blood vessels were seen coming from the sclera, under the limbus, going deeply into the opacities, which in a few days became red. In less than three weeks only a small stria remained in the R. E. and a small dot in the L. E. Insufflations of calomel were prescribed, and now, three months later, the condition is much improved, and the corneæ bid fair to exhibit yet greater transparency.

Family History.—Mr. and Mrs M., father and mother, are both free from syphilis, but both showed strong scrofulous tendency when young. On the mother's side the father contracted syphilis before marrying. One year before her birth the father complained of violent headaches and soon had an attack of paraplegia followed by loss of memory and disorder of speech. Three months after Mrs M.'s birth her father had new paralytic attacks and soon died (age 35). Mrs. M 's mother was well and strong; she, however, died three years after her husband, having had two children, a son (born prematurely) who died when two weeks old, and a daughter, Mrs. M.

Mrs. M. had been married 19 years, and was suffering from a chronic inflammation of the vagina, which treatment ameliorated and resulted in pregnancy for the first time.

Having excluded all artificial irritation from without, and considering the character of the disease, its location, and finally its ultimate course, the diagnosis of congenital opacities seems to be the only correct one to make.

Thanks to the researches of Ammon, Steffan, Kruse and others, the origin of congenital spots in the cornea is no longer an enigma. Embryology has enlightened us on many obscure intra-uterine changes.

Kalliker demonstrated that the cornea forms a part of the sclera of the mesoderm, and that it is only at the end of the third month or at the beginning of the fourth that the latter clears up. The possibility of its being opaque because of retardation or cessation in the process becomes at once evident.

Some observers explain thus the origin of a number of congenital opacities. Steffan accounts for these in two ways: (1) Arrest of development (*Hemmungsbildungen*), and (2), anomalies occurring during the development of corneal tissues (*Bildungsanomalien*).

The majority of congenital spots in the corneæ are classified under these two categories, but a third cannot be ignored, i. e , those caused by inflammatory processes in utero. The existence of this third group is verified by the observations of Panas, Zender, Tiepliachine and others. De Wecker divides congenital inflammatory opacities into three classes:

1. Opacities caused by glaucomatous process.
2. Congenital adherent leucomata.
3. Sclerotic opacities.

To which of the two groups does our individual case belong? To the inflammatory or non-inflammatory?

The slightly premature birth cannot be considered as causative. Kruse's researches demonstrate that before the seventh month of embryonic life the cornea has attained full development, being only a little thinner than at birth. It might be proposed that we have for consideration an arrest of development, i. e., an imperfect transformation of fusiform cells into fibrillæ. But the history of the case, the sudden vascular change in the deep layers and the ultimate cause of the trouble refute the plea for arrest of development and non-inflammatory origin. We therefore classify it in the inflammatory group and in De Wecker's third class, i. e., parenchymatous keratitis.

As for the etiology of the disease we add the following: An interstitial keratitis is often found in subjects whose parents are free from syphilis. In such cases we look for the cause in scrofula, tuberculosis, debility, etc.

In this particular case the child could have inherited a scrofulous tendency from his parents, and the defective nutrition had some influence upon the state of the corneæ at birth.

The grand-father's history and death seem to point to specific trouble, and therefore to a more rational cause of the corneal disease.

Mrs. M. suffering from scrofula only could have transmitted the syphilitic dyscrasia to her son, and for this reason we have a right to consider his keratitis a syphilitic affection in the second generation.

H. A. BEAUDOUX.

Erythropsia—by Professor Ernst Fuchs, of Vienna. *Graefe's Archivs*, Vol. 42, No. 4. Oct. 1896.

This is an exhaustive article well worthy of perusal, giving in detail Dr. Fuchs' elaborate researches and deductions in regard to the interesting subject of Erythropsia.

One feels obliged, considering the masterly handling of the subject, to review it rather fully.

In a short historical reference it is pointed out that Becker so far back as 1877 mentions the occurrence of Erythropsia after extraction in 3% to 5% of all cases of cataract.

The majority of cases reported since have been mainly those in which the lens was absent or the pupil dilated.

The external conditions favoring its appearance are dazzling or overheating.

The above variety of Erythropsia constitute the theme of Fuchs' article.

There are other atypical forms namely; that of the epileptic aura, in which the red vision assumes definite forms, such as flames, figures, etc.: then again the red vision arising from intraocular hemorrhage; also a very interesting variety which appears when one has a bright light close to the side of one eye, the other eye being shaded, here dark objects appear red to the illuminated eye, and light objects red, to the shaded eye.

A very interesting example of this found in history, is the occasion on which Henry IV of France was playing chess with the Duc d' Alencon on the eve of St. Bartholomew's massacre—the chessmen appearing red.

Other atypical forms occur during the course of severe fevers, after a saber wound in the vicinity of the eye, in optic atrophy, in Migraine, in Hyperopia, etc.,—it is very doubtful if these are of central or peripheral origin.

The typical erythropsia is caused by retinal dazzling, more light than usual reaching the retina, or else the retina reacts abnormally to ordinary light stimulus.

Fuchs here mentions several typical cases after observing a sun eclipse, a lightning flash and bright reflection of light from the surface of sea.

Dazzling due to sunlight reflected from snow almost invariably causes Erythropsia, especially at considerable heights above the sea, and the Erythropsia is more marked if the illumination is suddenly diminished as when one enters a house.

Fuchs first observed Erythropsia in his own experience in 1894 after trudging through the snow to the top of a hill 2278 metres high The snow was freshly fallen and the day being cloudy he wore no protection glasses—the walk extended over four hours.

On entering a hut, he observed after a few seconds that every object appeared a rosy purple, except some very dark ones which were yellowish green in color. The Erythropsia disappeared in a few minutes. The next day his skin was very red and swollen, finally peeling off.

These symptoms Fuchs found were due to the preponderance of violet and extra violet rays in the light—the overclouded day and the height above the sea favoring their development—in addition the snow reflects these short waves of light more than the long ones.

Very few cases of Erythropsia in normal eyes have been reported, which Fuchs considers is due to the great height necessary for its development, and to the necessity of withdrawing into a darkened place to observe them.

Erythropsia is not noted in Arctic regions where snow blindness is so common as there are no great elevations.

In abnormal eyes, Erythropsia is far from uncommon, e. g. aphakic eyes or eyes with dilated pupils or colobomata, being due to the unusual amount of light reaching the retina.

Sometimes it is seen in cases of opacity of the media, and is due to some much diffused light reaching the retina.

Abnormal reaction of the retina to light is also a cause of Erythropsia for example, the congestion occurring after eating, in anger, overheating, dancing, laughing, coughing, suppression of the menses, etc. These however do not alone cause Erythropsia, but simply predispose when other conditions favor, e. g. the dilated pupil of anger.

Disturbance of general nutrition favors it as in Hemeralopia with pregnancy or lactation; both Hemeralopia and Erythropsia may be here present together or at different periods, and are likely due to faulty reproduction of the visual purple in the weakened retina.

There are certain definite rules followed by Erythropsia:

1st. It appears when one passes from the bright light into a darker place, e. g., a house or it may be seen only at dusk, when the candle is lit, the flame appearing red.

2nd. Often noticed on first awaking in the morning and rapidly disappears.

3rd. Once Erythropsia has appeared, it is prone to recur day after day without additional exposure to bright light—one attack thus predisposes.

This red vision shows itself especially on observing clear objects, e. g., flame, tablecloth, etc.

The true color of an object is perceived through this red shimmer, except green, which, if not saturated, appears gray—a black coat appears either, or if shiny, slightly red—if an object is of a dense saturated black color it appears greenish.

The reddish color of Erythropsia is of a purple shade.

Erythropsia may occur only in one eye (aphakic), or only in one part of the field, e. g., the lower part from the upper portion of the retina being most stimulated by snow surface below it.

Erythropsia is a perpetual phenomenon.

Fuchs then details his experiments very fully and as a result states that Erythropsia is a physiological, not a pathological phenomenon.

In pathological states, this physiological phenomenon can be more marked and last longer.

Fuchs found that he could get the same Erythropsia without ascending mountains, by simply dilating the pupil and making the experiments on the lowlands.

A chess board was used to study the phases of Erythropsia.

After gazing on the snow for some time just short of being intensely dazzled, if one goes indoors and looks at a chess board, after the retina has had time to adapt itself, the black squares of the board appear green. The green gradually becomes more intense, and soon the white assume a yellowish green tint.

If the illumination be suddenly increased the green fades only to reappear more vividly on diminishing the light again. The purplish red soon appears, unless the original dazzling were very slight when the change may not pass beyond the green stage.

This green phase is very transient and is faint, indeed sometimes hardly noted on the *white* squares—occasionally not even noted on black squares, as at this early stage the general vision of the eye is very poor from the dazzling.

In marked cases fifteen seconds elapsed before the red purple vision was noticeable. It begins at edge of white and spreads over them, while the black squares, where they glistened, also appeared reddish, but where most black were greenish.

The whole phenomenon takes one to two minutes to reach a maximum and then rapidly disappears, four minutes in all covering its duration.

The slighter the preceding dazzling the weaker is the Erythropsia, sometimes an orange tinge may precede and follow the Erythropsia

and in faint cases only the orange color may be observed. If the illumination be suddenly increased the Erythropsia is more vivid, thus differing from the green vision.

This may be due to the retina being rested in the shade and reacting more lively to the increased stimulation.

The field as observed by the perimeter is interesting.

As a rule the Erythropsia, unless it be very vivid fails in area of 3 to 5 from the center outwards, but if very vivid may be observable here.

The extent which the Erythropsia reaches towards the periphery far exceeds that of the normal red field, indeed in marked cases it may extend to the limits of the white field, and again as it fades it gradually contracts to the narrow ring surrounding the center.

Occasionally the fading took place from within outwards.

The center as observed through a stenopaic aperture appeared darkish violet surrounded by a green shadow, or sometimes it was entirely green. Sometimes also outside of this green area of the center but inside the capillary zone was a reddish band.

As the Erythropsia of the peripheral part of the field increased, the green of the center did likewise while here and there little red spots could be noticed in it. With decrudescence of the Erythropsia the center became colorless while the periphery of its non-vascular area became rosy or the green of the central spot extended over the whole non-vascular area.

Fuchs composed his color perceptions with a solution of Fuchsin, 0.1 ccm. of an alcoholic solution of Fuchsin in 2 litres of water. This was put in a wedge-shaped glass, hence the shade varied with the breadth of the glass.

All colored objects appeared red, their real color only be appreciated as they were brought near the fixation point.

After Erythropsia had disappeared no variation was found in the normal field for colors.

As a result of placing colored glasses in front of the eye while making the experiments, it was found that the Erythropsia was independent of the color of the stimulating light.

If the dazzling were too faint, then only the after image of the colored glass was seen, Erythropsia not developing, otherwise, however, it was most marked.

Sometimes after the experiments were finished, the snow would appear faintly rosey from time to time, in wave-like phases, as is occasionally

observed by the eye with undilated pupil when one has gazed for a length of time on the bright.

In *aphakic* eyes, the green stage was not noted, it also required quarter to half an hour for it to develop after coming into a shaded place. In the center the red was fainter—it did not extend so far toward the periphery of the field as in the normal field. The Erythropsia lasted from an hour to a day, and easily recurred on following days, especially on awaking or on lighting a candle. This recurrence tendency is the main difference from normal eyes. The colors and the spectral pigment changes were the same as in normal eyes.

In the *Color-blind*—if green blind, the green stage and green vision at the center was wanting.

In *Hemeralopia* (congenital) the result was a clear but faint Erythropsia.

In aphakic eyes, after operation, we get frequently blue vision and sometimes red vision, i. e., green blindness. Both may exist in the same eyes.

As to the light sense in aphakic eyes, it is worth while to notice it as bearing on this subject of Erythropsia.

The lens normally absorbs some violet and ultra-violet rays and changes others in virtue of its own fluorescence into rays of greater wave length.

In the yellowish senile lens many blue waves are also absorbed.

In the absence of the lens such a quantity of short wave rays entering the eye, use up the visual substance of the retina more rapidly than in eyes possessed of lenses. The retina now requires longer to recover and adapt itself to ordinary light than the normal eye, but it would appear no permanent injury is done to the eye.

Professor Fuchs now offers a good and elaborate explanation of the phenomena.

All daylight is reddish, and is only considered white, inasmuch as our retina after prolonged exposure to any prevailing color regards it as white.

To decide the color of anything accurately and especially in this case of the light reflected from the snow we study its after image.

That of the snow is violet and as dark objects seen on the snow appear dark still, the after image is positive, hence the primary color of the snow light is violet. Later the violet after passing through meances of green becomes purplish and the dark objects clear and violet; this is then a negative after image, and is complementary in color.

The greenish phase of these after images can be obtained by prolonged exposure of the eye to bright snow light but differs from the pro-erythropic green in that it is most clearly seen on the light areas of the chessboard, as all complementary colors are.

The Erythropsia is not a positive after image nor is it a complementary color as it occurs entirely independently of the color of the stimulating light and various other differences are cited especially the factthat projected on a clear or dark ground, the green and reddish images are not complementary and are markedly independent of one another.

Again Erythropsia is very weak or fails in the center of the field, being the very opposite to after images, which are intensest at the center and weak at the periphery.

Fuchs' theory of the Erythropsia is that they are dioptric phenomena due to the visual purple becoming visible.

This theory would fail of course when these "dazzle images" (as Fuchs calls them) are seen on a dark field (eyes closed).

Here is however no Erythropsia, and it must be explained on the old theory of tiring and recuperation of the retina, which also would account for the marked independence of the color images seen with the open and closed eye.

The retina is purple, and it has been shown to be visible under certain conditions.

We do not observe it continually because it is always present and is also present over the whole field, just as old people do not observe the yellowish color of their lenses.

From long exposure to snow light, the violet and ultra-violet rays bleach the purple and the reproduction going on in a shaded place is so rapid and intense that we become aware of it.

The question is how the rays of light act. They may be reflected from the pigmented outer ends of the rods and the pigment epithelium on to the cones, the short waved violet rays being most active and easily reflected.

Kuhne says the usual purple is reformed afresh and also from pre-existing "visual white," the latter passing through shades of orange, citron and red to purple.

J. W. STIRLING.

REPORTS OF SOCIETIES.

SECTION ON OPHTHALMOLOGY.

College of Physicians of Philadelphia.

Meeting of the Section on Ophthalmology of the College of Physicians, November 17, 1896.

Dr. J. M. Da Costa in the chair.

Unilateral Albuminuric Retinitis, with a case, by G. E. de Schweinitz, M. D. After a brief review of the literature of unilateral albuminuric retinitis, during which reference was made to fifteen cases, Dr. de Schweinitz reported two examples that had come under his care, both in colored men. In the one instance clinical examination indicated chronic nephritis, and there was unilateral neuro-retinitis. The patient, however, was not seen again and his subsequent history was unknown. In the second case the patient had been under observation for five months, and had all the symptoms of chronic interstitial nephritis with unilateral (right side) retinal lesions. Water colors by Miss Washington, illustrating the condition in two stages, were presented, indicating that the primary lesion had probably been a thrombosis in the lower nasal vein with secondary involvement of the disc and retina. Dr. de Schweinitz agreed with Knies that unilateral albuminuric retinitis is not so great a rarity as some text-books would lead us to believe. A certain percentage of cases maintain monocular lesions until death; in another the unilateral character of the affection is maintained for a considerable portion of time, but ultimately becomes bilateral. Dr. de Schweinitz suggested that an interesting clinical observation in these unilateral cases would result from catheterization of the ureters and separate analysis of the urine from each kidney. His patient had declined to submit to this procedure.

Discussion.—Dr. J. M. Da Costa: Has there been microscopic examinations in cases of this character? This question is suggested because it is uncommon to have one kidney alone affected.

Dr. de Schweinitz: So far as I am aware, but one post-mortem is recorded, namely, Yvert's case. The right kidney alone, in a state of parenchymatous nephritis, was present, but although Yvert is a French military surgeon and reports with characteristic exactness, if my memory serves me correctly, there was no microscopic examination, but only a description of the coarse pathologic anatomy of the specimen. Cheatham is often credited with an autopsy, especially in foreign abstracts, but his report contains clinical data only, and the autopsy referred to in his paper is the French case just described.

Dr. Wm. F. Norris: I should like Dr. Da Costa's opinion as to why one kidney, any more than one eye, should be the sole sufferer.

Dr. Da Costa: I suppose if I were to theorize I should explain it through the action of the sympathetic nerve, and assume it to be for the same reason that there is flush in pneumonia on that side of the cheek corresponding to the side of the affected lung. This is a very common clinical observation and is the only analogy that occurs to me. I know of nothing from observation that bears on this point.

Report of the Successful Removal of a Piece of Steel from the Vitreous by the Hirschberg Magnet, and exhibition of the patient, by G. Oram Ring, M. D. J. S., aged 28, was admitted to the wards of the Episcopal Hospital, June, 1896. Six hours previously a piece of steel from an anvil penetrated the right lower lid and the ocular coats, and was lodged in the nasal side of the anterior portion of the vitreous where its position could be distinctly outlined. The cornea, iris and lens were uninjured. A minute bead of vitreous protruded from the wound in the sclera. The choroid was ruptured and retinal hemorrhage was profuse at the site of the injury, V. $\frac{20}{200}$. The following day, under antisepsis and cocain anesthesia, an incision was made with a Graefe knife through the conjunctiva and sclera 6 mm. from the corneal border and opposite its lower third. While the edges were retraced by an assistant, the straight tip of a Hirschberg magnet was inserted. Upon withdrawal of the magnet, after its second introduction, a piece of steel 6x2x1 mm. was found clinging to it. No sutures were used. Recovery was prompt and uneventful. A patch of atrophied choroid corresponding to the rupture can be seen through the now transparent vitreous. The vision has increased to $\frac{20}{70}$.

A Case of Foreign Body in the Vitreous, with exhibition of the patient, by M. W. Zimmerman, M. D. The patient, J. J., was wounded by the explosion of a copper dynamite cartridge January 18, 1890. The fragment entered the sclera of the left eye 7 to 8 mm. to the nasal side of the corneal limbus. Blood filled the anterior chamber for two days. After absorption the foreign body could be seen in the vitreous opposite the base of the iris on the temporal side. A drawing made at this time represents exactly its present position and appearance. One year later there was a moderate hyalitis of unknown origin, and confined to this eye, ending in complete recovery. The patient was treated at this time by the late Dr. George T. Lewis, whose notes furnish the above facts. The boy consulted me first in March, 1896, on account of accommodative asthenopia. A weak hyperopic cylinder

relieved the symptoms and gave normal vision, which has continued. The presence and unaltered position of a piece of copper for seven years without irritation gave interest to the case, and particularly in view of the opinion of Leber and others, that copper is more dangerous to the safety of the eye than other metals. In this case the fragment has become lightly encysted and gives no metallic reflex, excepting in a very dark room, where it emits to the illumination of the ophthalmoscopic mirror a reddish tinge.

Discussion.—Dr. G. C. Harlan had the opportunity of following a case in which a piece of gun-cap had been imbedded in the retina for three years, without causing irritation.

Dr. Chas. H. Thomas: Several years ago I had under my care a group of cases of gun-cap injuries to the eye. In all, on account of rapid degeneration and threatening sympathetic ophthalmia, I was obliged to enucleate, although in two cases the foreign body had been carried for periods of eighteen and twenty-two years, respectively.

Dr. S. D. Risley asked the President if he recalled to mind the eye enucleated at the University Hospital some years ago, where a foreign body was found sticking in the end of the optic nerve, the presence of which had not been suspected.

Dr. B. A. Randall spoke of another case in which the foreign body had remained quiescent for a long time. He believes that such results are due to encapsulation of the foreign substance. There was an interesting case which he drew for Dr. Norris at the University Hospital some ten years ago, as he may remember, where the bright piece of gun-cap was visible at the lower margin of the pupil, suspended in the remains of the lens capsule, and giving rise to little irritation; whence it was successfully removed by operation.

Dr. Norris: I recollect very well the two cases that have been mentioned; the piece of metal which I extracted from the anterior chamber was a movable one; the patient could throw the foreign body from the anterior to the posterior chamber at will. I have no doubt the ultimate trouble was due to mechanical irritation as well as to the fact that the foreign body was copper. If I recollect aright, the man had some sight in the eye, although greatly impaired. It has always seemed to me that the reaction from these materials depended, first, on their asepsis at the time they entered the eye, and, secondly, on their state of comminution. All the Fellows are probably aware of Leber's ingenious experiments on this subject; he was very careful to introduce aseptic material, but the metals which he chose for this purpose were always

in the finest state of pulverization, so that they were in the most favorable condition to be acted on by fluids of the eye. The copper and lead were promptly acted on and caused inflammatory reaction in the vitreous and retina; while the so called "noble metals," gold and silver, in a similar state of pulverization, produced the same effects to a less degree. On the other hand, there are quite a number of cases where metallic foreign bodies have remained in the eye for a very long time without injurious results. Jäger has related a case where he watched for years a foreign body in the vitreous, which was apparently absolutely harmless as long as it remained encapsuled, and when it subsequently, some years later, sank in the vitreous, it commenced to make trouble. Of course, if there is a good layer of fibrin around one of these foreign bodies, there is less chance for chemical action and corrosion by the fluids of the eye and for absorption of metallic salts.

Dr. Howard F. Hansell: I would like to refer to a case that is still under treatment. One year ago the patient applied at the Jefferson College Hospital, and we determined the presence of a piece of steel in the eye. The inflammatory symptoms, however, subsided, and since he lived in Philadelphia and was easily accessible, we adopted the expectant treatment. The vision was lost and the eye gradually atrophied. This year he came back with opaque lens, discolored iris, atrophic eye, and a great deal of pain; he asked that something should be done for it. He was sent to the Polyclinic Hospital for examination by the Röntgen ray process, not so much to determine whether a foreign body was there, but to learn whether the rays would show the shadow. Dr. Stern, with a great deal of patience and skill, was able to get a beautiful skiagraph showing the presence of the foreign body. We endeavored to remove the steel by means of a magnet, but were unsuccessful. I then enucleated the eye and found a piece of steel ⅛ of an inch long, caught in the ciliary body.

In answer to a question of Dr. Oliver, Dr. Hansell explained the method adopted by Dr. Stern, as follows: The plate was made fast against the man's temple, then by means of a lead funnel the rays were directed toward the inner angle of the eye of the other side, and passing through the nasal bones the outline of the outer angle of the orbit was distinctly shown. The steel was in the ciliary region and cast a well-defined shadow, while the eye itself was dimly outlined.

I may say, in this connection, that my friend, Dr. Clark, in Columbus, has made some successful experiments with this process, and has been

unable to determine the presence of a foreign body posterior to the iris by thrusting a very narrow plate covered with rubber up the nostrils.

Dr. Hansell read a paper upon *Report of the Successful Removal of a Piece of Steel from the Vitreous by the Hirschberg Magnet*, and exhibited the patient. J. S. received a small fragment of metal in the left eye in April, 1896. After the transient discomfort had subsided, he gave the accident no further thought, until it was revived in his memory by the questions asked when he applied in October at the Jefferson Hospital, on account of failing vision and inflammation in the eye. A bright reflecting piece of metal could be readily seen with the ophthalmoscope floating in the vitreous, and small scar below, and to the outside of the corneal limbus, was found, after careful searching. V. $\frac{20}{200}$. An incision through the conjunctiva and sclera between the external and inferior rectus was made, through which the smallest tip of the Hirschberg magnet was inserted. After two unsuccessful efforts, a small triangular, corroded piece of steel was removed with the loss of an insignificant amount of vitreous. In one week the vision was $\frac{20}{30}$. Three points may be noticed in connection with this case; namely, the comparatively long time between the entrance of the steel and its removal, the retractions of the edges of the scleral cut as the tip of the magnet was withdrawn, and the recovery of excellent vision.

Dr. Charles A. Oliver presented a *Brief Clinical and Histologic Study of a Case of Epithelioma of the Corneo-Scleral Junction.* The condition was found in a sixty-nine year old man. The growth first manifested itself as a small "pimple" at the lower outer corneal border of the right eye, and gradually and painlessly increased in size. When first seen, it appeared as a fleshy and wart-like looking mass about the size of a pea, and embraced an area equal to almost the outer quadrant of the cornea,

In spite of careful excision with free thermo-cauterization repeated more extensively some two months later, the mass recurred until in four months' time it had become so great in size and so angry in appearance, that the eyeball with the surrounding conjunctiva was removed, the operation, by reason of renal and cardiac disease in a weak and feeble patient, being almost painlessly done during local anesthesia by the use of hydrochlorate of cocaine. Up to present writing there has not been any recurrence.

From a clinical standpoint the case is most interesting. Commencing as a "pimple" in the epithelial structures of the conjunctiva at the transition-border between the cornea and sclera, as is almost

universal in such cases, the mass gradually and painlessly increased in size until it assumed the papillomatous variety of growth. It then extended into and beneath the epithelium of the cornea far in toward the summit of the membrane. In other words the tumor-mass evidenced its development and growth in a manner that is eminently characteristic of epitheliomatous formations.

The quick recurrence and steady increase of the growth, in defiance of the extreme radical measures employed for extirpation, manifestly evidenced the necessity of removal of the entire field of malignancy. The almost uncontrollable oozing of blood, experienced during the operative procedure, plainly showed the extreme vascularity of the neoplasm.

Microscopically, the specimen was exceedingly instructive, not only by reason of presenting the characteristic appearance of epitheliomatous formation in the region involved, but on account of the undoubted protrusion of the epithelial cells into the interlamellar corneal spaces (which possibly might have been produced or rendered more easy by the operative procedures pursued in the earlier stages of the disease), and the insertion of the same form of malignant cells into the superficial layers of the sclera (layers which were untouched by operation); but is also of great interest in substantiating the view that the deepest penetration of the epithelial cells into the outermost tunics of the eye were in the transition-zone between the cornea and the sclera —that is, at the corneo-scleral junction.

Dr. Oliver exhibited a series of *Ophthalmoscopic Pictures of Peculiar and Rare Chorio-Retinal Changes, the Result of Traumatism.* The first of this grouping was seen but a few hours after the patient, a man of forty-two years of age, had been struck in the left eye by a fist. Almost total blindness ensued immediately after the accident.

The eyeball was unruptured. The cornea seemed unusually brilliant. The anterior chamber was deepened, especially in its peripheral portion. The pupil was round, and the iris, though tremulous, was mobile to consensual reaction. The lens was dislocated directly back, its superior border resting against the retina just behind the inferior portion of the equator of the globe. The vitreous humor contained some rather fixed, doubtful streaks of blood in its anterior portion.

As shown in a water-color sketch made by Miss Washington, the optic disc was greenish in tint and appeared bloodless. There were a few deeply situated hemorrhages in the retina, and a series of large

choroidal ones extending along the retinal vessels, which were reduced to mere threads. There were broad and greenish elevated areas, as though the deeper retinal tissues against the choroid were thickened, swollen, and opaque. The patient became blind in a few minutes and never regained vision.

In contrast with this sketch, which illustrated the grossest effects as seen ophthalmoscopically from concussion accidents, Dr. Oliver exhibited water-color drawings of five other cases extending from minor degrees of visible change to the more pronounced varieties, one of which (the fourth example) closely resembled the chromolithograph in Jonathan Hutchinson, Jr.'s, well-known case.

Discussion.—Dr. Harlan thought that in order to explain the blindness in Dr. Oliver's first case, there must have been injury to the retro-bulbar portion of the optic nerve resulting in a fracture of the orbit. In this Dr. Oliver coincided, believing this was proved by the bloodless condition of the optic nerve head and the greatly marked reduction of the main retinal trunks.

Dr. S. D. Risley: Some years ago I reported to this Section the history of a case to which my attention was called while absent on my summer vacation. A man had been thrown from a hay-rake, and was struck in the temple fossa by one of the teeth, which penetrated the soft tissues deeply and probably caused a fracture of the orbital plate. I found advanced atrophy of the optic nerve, marked infiltration of the tissues surrounding it, and large white patches in the macula and throughout the temporal half of the eye-ground, apparently the site of extensive hemorrhages, as remnants of the clots were still visible. In this case there had probably been a post-ocular hemorrhage following a temporary exophthalmos.

Dr. B. A. Randall: A case that I reported to the American Ophthalmological Society ten or twelve years ago had a little peculiarity which may have a bearing upon some of the peculiar appearances of the eye-ground. There was, as the result of traumatism, rupture near the disc, especially interesting and peculiar in that it passed up on the temporal side of the disc to its upper margin and then was lost in a rounded area to the nasal side that looked as if it had been subjected to torsion. The result was an inflammatory lesion leading to complete atrophy.

Dr. Edward Jackson presented a case of *Deficiency of Pigment, allowing the Fundus Reflex to Show through the Iris.* At a former meeting of the Section he had shown a similar case. Both of these

patients had undergone cataract extraction; in the one shown this evening these was rupture of the sphincter, the lens having proven to be larger than the average. It was the only time he had met this accident in simple extraction. The fundus reflex showed through other parts of the iris almost as readily as through the part at which the rupture occurred. Possibly it might be that there were other ruptures of the iris, but the distribution of the fundus reflex was entirely different from that indicating rupture of the iris. It constituted a general area of red against which the details of the iris were seen. It was a regular rounded area, and did not consist of fissures through which red reflex could be obtained. It could hardly be regarded as a rupture of the posterior layer of the iris because there was no change in the outline of the pupil. There was no deformity of the pupil in the case previously reported. Rupture of the posterior layer would necessarily cause deformity in the pupil, certainly a rupture of such considerable size. The posterior layer opposes the action of the sphincter, and the two together give the pupil its form. It is quite possible that this appearance is the result of atrophy of the pigment cells from stretching of the iris, but probably it is simply an atrophy comparable to the changes in the choroid in the eyes of many old people. Attention is called to this condition, one that may readily be overlooked, since it is perhaps more common than the two cases would seem to indicate. It is brought out while illuminating the fundus as much as possible, at the same time leaving the affected part of the iris in comparative darkness. As only three weeks had elapsed since the extraction, the time was too short for any extensive atrophy to occur. The pigment of the iris was not rubbed off by the lens in its passage through the pupil.

HOWARD F. HANSELL
Clerk of Section.

THE

OPHTHALMIC RECORD

A Monthly Review of the Progress of Ophthalmology.

VOL. VI. CHICAGO, FEBRUARY 1897. NO. 2. NEW SERIES.

EDITORIALS.

Recent improvements in the skiagraph have enabled ophthalmic surgeons to utilize the X-Rays in the detection and localization of bodies that have found lodgment within the globe when their presence could not be detected by the ophthalmoscope. In a discussion of a paper read at the November session of the Chicago Academy of Medicine Dr. Casey Wood drew attention to the fact that hitherto the bony orbit had proved impenetrable to the rays, or at least had so interfered with the skiagraphic process that the Roentgen apparatus, in all the attempts so far made and reported, had proved practically valueless. Recent reports of cases show that even before the date of this meeting, Dr. Max Stern, of the Philadelphia Polyclinic, had succeeded in obtaining the most accurate pictures of foreign bodies lodged within the eyeballs of patients that were subsequently operated upon with brilliant results, by Drs. Hansell, de Schweinitz, Oram Ring and others. In Dr. de Schweinitz' case, which we hope to report in the next number of the RECORD, two previous magnet operations had been done without effect, the extraction of the foreign body easily following the operation performed in the particular region indicated by the skiagraph. Doubtless we shall also have reported additional instances of the same kind, thus making a distinct advance in ophthalmic surgery.

Some time ago one of the editors of the RECORD contended in the columns of a journal devoted to general medicine, that the use of

cycloplegia and *mydriasis* as synonymous terms and of *mydriatic* and *cycloplegic* as interchangeable adjectives and adjective-nouns is one of the commonest errors one meets with in medical literature. There seems to be reason for reasserting this statement and to point out that a mydriatic may be, but is not necessarily, a cycloplegic, even though a cycloplegic is usually a mydriatic. A giant is always a man, but men are not necessarily giants. The electric current and a quarter-grain solution of cocain are, under certain conditions, mydriatics but neither of them is a cycloplegic. If one wishes to refer specifically to the dilation of the pupil the ancient term *mydriasis* should be employed, reserving the modern word cycloplegia (from *kuklos*, a circle, i. e. the ciliaryring and *plege*, a stroke) for indicating a paralysis of the ciliary muscle. C. A. W.

Owing to some defects in the printing of the Chromolithograph illustrative of Dr. Beard's article in the January number of the RECORD, it was decided to inclose a corrected copy in the February issue. Subscribers may thus substitute the latter print for the first one sent them.

MISCELLANEOUS.

Dr. H. V. Würdemann has removed from 805 Grand Ave. to the Pierce Building, Suites 40 and 41, No. 128 Wisconsin st.; Milwaukee.

PROGRAMME OF THE PAPERS ON OPHTHALMOLOGY TO BE PRESENTED TO THE WESTERN OPHTHALMOLOGICAL, OTOLOGICAL, LARYNGOLOGICAL AND RHINOLOGICAL ASSOCIATION.

Second Annual Meeting, St. Louis, Mo., April Eighth and Ninth, 1897.

PRESENTATION OF PAPERS IN OPHTHALMOLOGY.

A Pyramidal and Senile Cataract in one subject, Report of a Case.
Dr. George F. Suker, Toledo, Ohio.

A Case of Oculo-Motor Paralysis.
Dr. Geo. E. Bellows, Kansas City, Mo.

Some Observations upon the Irritating Effects of Natural Gas upon Trachoma. Dr. John Johnson Kyle, Marion, Ind.

Astigmatism. Dr. Dudley S. Reynolds, Louisville, Ky.

Skin Grafting for Malignancy of the Orbit and Entropion.
Dr. Flavel B. Tiffany, Kansas City, Mo.

Restoration of the Eye Lids by Skin Grafting,
Dr. W. C. Tyree, Kansas City, Mo.

An Improved Skiascope. Dr. J. Ellis Jennings, St. Louis, Mo.

Scopolamine as a Mydriatic and Cycloplegic.
Dr. Wm. S. Fowler, Chicago, Ill.

Optic Neuritis. Dr. F. C. Evans, Louisville, Ky.

Report of a Case of Congenital Membraneous Cataract with Aphakia. Dr. A. S. Magee, Topeka, Kansas.

Moderate Errors of Refraction: Shall We Always Correct Them
Dr. Albert E. Bulson, Ft. Wayne, Ind.

Mental Depression and Prolonged Melancholia Following Graduated Tenotomy and the Limitation of Prisms.
Dr. W. H. Baker, Lynchburg, Va.

Keratoconus. Dr. J. W. Bullard, Pawnee City, Neb.

A Case of Inflammatory Glaucoma of Reflex Nasal Origin.
Dr. J. Aloysius Mullen, Houston, Tex.

Syphilitic Amblyopia. Dr. Robt. F. Lemond, Denver, Colo.

Congenital Nystagmus. Dr. J. Elliott Colburn, Chicago, Ill.

College Instruction in Ophthalmology.
Dr. A. M. Lapsley, Keokuk, Ia

The Value of Hypnotic Suggestion in Ophthalmic Practice.
Dr. Jgnatz Mayer, Guthrie, Ok. Ty.

Description of Dr. McCassy's Trial Frame, and Lachrymal Style and Threaded Handle. Dr. J. H. Johnson, Kansas City, Mo.

The Aetiology, Treatment and Prognosis in Exophthalmic Goitre.
Dr. J. Fred Clark, Fairfield, Ia.

Extraction of Bilateral Soft Cataract in the Case of a Child Three Years Old. Dr. J. O. McReynolds, Dallas, Tex.

Friday, April 9th.

Session at 8.30 o'clock.

PAPERS.

Ulcers of the Cornea. Dr. H. Z. Gill, Pittsburgh, Kans.

The Relative Value of Enucleation and Evisceration.
Dr. A. R. Amos, Des Moines, Ia.

A Plea for More Mild Treatment of the Conjunctiva.
Dr. E. W. Ames, Canton, Ill.
Thrombosis of the Lateral Sinus. Dr. B. F. Church, Dallas, Tex.
Chronic Rhinitis as a Factor in Weakened Vision.
Dr. Joseph A. Daniel, Davenport, Ia.
Treatment of Corneal Lesions by Hydraulic Curetting with Sublimate Solutions. Dr. C. H. Pleasants, Helena, Mont.
Toleration of the Eye to Severe Injuries.
Dr. H. G. Sherman, Cleveland, O.

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Dr. J. W. Sherer, of Philadelphia, will be associated with Dr. Würdemann after January 15th, 1896.

Dr. C. W. Root, who has been with Dr. Würdemann for two years, has gone to Philadelphia.

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